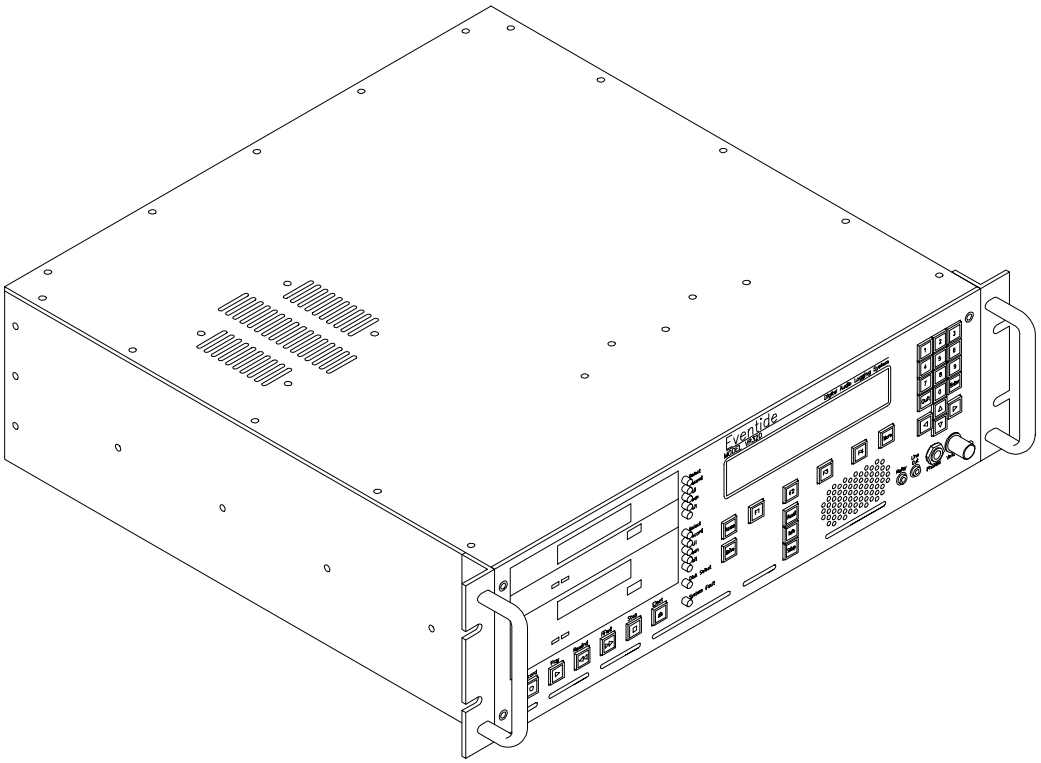
MAINTENANCE MANUAL

for

MODEL VR320

AUDIO LOGGING RECORDER



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January 28, 1999

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RECORD OF REVISIONS

Retain this record of Revisions in the front of the manual. When you get a revision, put the revision pages in the manual.

Write this date on the Record of Revisions:

- The date the revision was put in the manual
- The initial of the person who put the revision in the manual.

Rev No.	Date Issued	Date Inserted	By	Rev No.	Date Issued	Date Inserted	By
Basic	Jan 28/99						

LIST OF EFFECTIVE PAGES

The List of Effective Pages records not only each page of subject revision but also each previously issued page which is still correct. Pages which are no longer current do not appear on this list. If there is any question about the currency of the recipient's copy, it is recommended that each page of the manual be checked off against this List of Effective Pages. Any page which does not check out with this list, either by page or by date, shall be discarded.

CHAPTER 1
INTRODUCTION

Section I. GENERAL INFORMATION

1-1. INTRODUCTION.

The VR320 is not intended to be serviceable to the component level. The circuit board assemblies contained in the unit utilize surface mount components which are heat sensitive and difficult to desolder for individuals not familiar with surface mount technology.

The unit has built in firmware diagnostics that can be utilized to provide sufficient information to indicate which assembly is defective or the cause of particular problem. Replacement assemblies and circuit boards are available on an exchange basis for "in warranty" and "out of warranty" repairs on an overnight basis if necessary. In addition, direct factory technical support is available via telephone during normal business hours 9 a.m. to 5 p.m. Monday through Friday E.S.T. by calling (201) 641-1200.

SAFETY DEFINITIONS:

WARNING Indicates potential danger to humans.

CAUTION Indicates potential danger to equipment.

1-2. CONFIGURATIONS.

Your VR320 has several features and options that are determined when the unit is ordered. It may have one or two media drives. It may have 8, 16, 24, 32, 40, or 48 audio input channels. In addition, the inputs may be configured differently depending upon your audio signal sources. Finally, a provision for automatic media labeling is provided by an optional label printer. As you unpack your VR320, please confirm that the unit you received is the unit you ordered. For your convenience, the following is provided to record your unit's configuration. We suggest that you complete it now. This information will be required if you should need to communicate with the factory about your VR320.

MODEL VR320, SERIAL NUMBER _____ NUMBER OF DRIVES **1** **2**
(Serial number and options information appears on the rear panel data plate.)

DRIVE TYPE ☐ 4MM DAT ☐ 8MM EXABYTE ☐ MAGNETO-OPTICAL ☐ DVD-RAM
FIRMWARE VERSION _____
(On display during turn-on, accessible from the menus.)

If your unit is not configured as desired, or if you should need to change the configuration in the future, drives and channels can be added easily.

INPUT BOARD #1 Audio ☐ Telephone ☐ 8 Channel ☐ (chs 1-8) 16 Channel ☐ (chs 1-16)
INPUT BOARD #2 Audio ☐ Telephone ☐ 8 Channel ☐ (chs 17-24) 16 Channel ☐ (chs 17-32)
INPUT BOARD #3 Audio ☐ Telephone ☐ 8 Channel ☐ (chs 33-40) 16 Channel ☐ (chs 33-48)

LABEL PRINTER: **Y N** STATUS PRINTER model_____

Section II. EQUIPMENT DESCRIPTION AND DATA

1-3. PURPOSE AND FEATURES.

1-3.1 Purpose. The VR320 Audio Logging Recorder is a multi-channel, full-featured digital logging system. The recorder stores voice files on 4mm Digital Audio Tape (DAT) cartridge, 8mm Exabyte cassette, DVD-RAM, or magneto-optical disk. An internal hard disk drive provides instant playback feature and allows changing removeable media with no loss of material.

1-3.2 Features. The VR320 has several features, capabilities, and options.

- Converts all inputs to digital format and records them on “DDS” cassettes, Exabyte 8mm cartridges, magneto-optical disks, and rewriteable DVD-RAM.
- Media fits in palm of hand, yet each can hold several hundred channel-hours of audio.
- Digital format allows additional information to be stored, such as time codes and channel content information.
- One or two archive drives.
- May contain 8, 16, 24, 32, 40, or 48 audio signal input channels.
- Input options allow different configurations depending upon the audio signal sources.
- Transport control keys emulate the familiar controls of an ordinary tape recorder.
- Large front panel display: 4-lines, 40 characters
- F1 through F4 soft keys that access displayed functions located directly above them on the front panel display. These functions vary as you go through the different menus. The menus control some of the more advanced features of the unit.
- Contains a front panel keypad to facilitate the entry of parameters and a password.
- All transport control keys, soft keys, function keys, and the keypad are illuminated when active.

1-4. EQUIPMENT DATA.

1-4.1 Weight and Dimensions.

- Weight 33 pounds (14.98 kg)
- Height 5 inches (127 mm)
- Width (main frame) 16-7/8 inches (428.6 mm)

- Width (front panel) 17-1/4 inches (438.2 mm) (with 1 inch (25.4 mm) additional extension for each handle) (rack ears for 19-inch rack mount)
- Depth (main frame) 17 inches (431.8 mm)

1-4.2 Power Requirement. The VR320 is factory-configured for the line voltage of the country of installation. Fuse type is 2A, 250V, time-delay, 20 mm (Eventide P/N 316054). Same type is used for 115 VAC or 230 VAC.

1-5. ACCESSORIES AND OPTIONS.

Description	Part/Model Number
Label Printer	Seiko Model SLP1000
Status Printer	Various (serial)
Accessory Playback Unit	Eventide model VR204
90 Meter DAT (DDS-1)	Various (Maxell and Sony recommended)
120 Meter DAT (DDS-2)	Various (Maxell and Sony recommended)
125 Meter DAT (DDS-3)	Various (Sony recommended)
DAT Cleaning Cartridge	Various (Sony recommended)
PC Remote Control	Eventide Part Number 110000
Satellite Chronometer	Eventide Part Number ECW-40
Magneto-Optical Media	Eventide Part Number 240009
DVD-RAM Media	Eventide Part Number 240011
Desktop Enclosure	Eventide Part Number 240002
Large Internal Hard Drive	Call Eventide to inquire about the latest size and design.

CHAPTER 2
PREPARATION FOR USE AND INSTALLATION

Section I. FAMILIARIZATION

2-1. GENERAL.

This section will familiarize you with the VR320. It is recommended that the initial setup be done prior to installing the unit in its permanent operating location. Chapter 3 of the Operator's Manual discusses the detailed configuration procedures for setting up your unit at your facility. It is assumed in this section that you have an audio input signal available to be connected to the VR320 Channel One input.

2-2. INITIAL SETUP.

2-2.1 Telephone Board Connection (Phoenix Connector).

a. Locate an active telephone line in the area you are working.

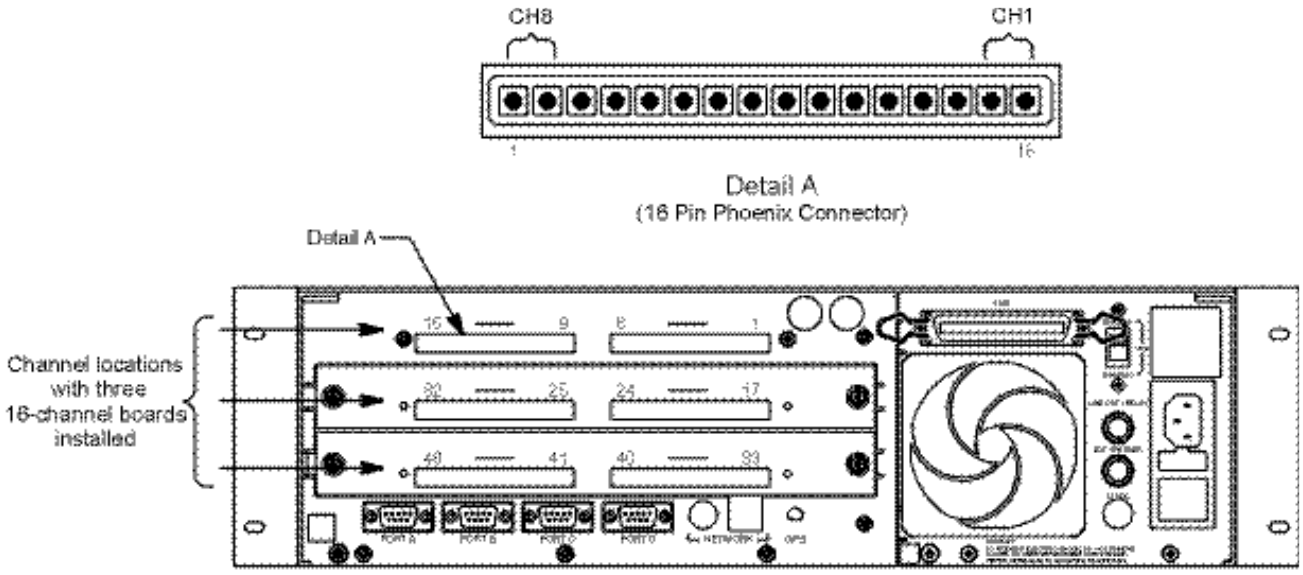
b. Connect the telephone line "tip" lead to pin 1 and the "ring" lead to pin 2 of the 16 contact input connector (provided with the unit). See Figure 2-1.

2-2.2 Audio Board (Amphenol Connector).

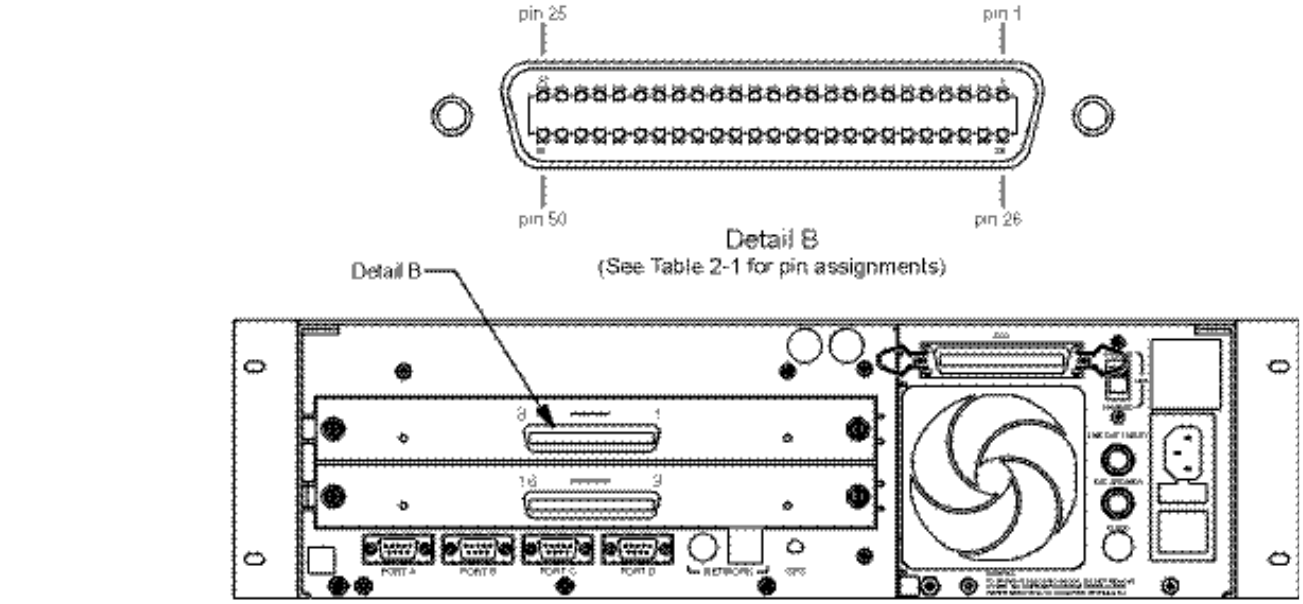
a. Obtain an approximately "line level" signal source. (Something as simple as a "Walkman" or portable CD player will do.)

b. Connect the signal source line output to pins 1 and 26 of the top connector on the rear of the VR320 (using the male 50-pin connector provided). See Figure 2-1.

2-2.3 Additional Hardware. One blank medium per drive is provided with each VR320. No other hardware is necessary for this exercise. Monitor the VR320 with its internal speaker. You can also use a set of headphones (with a mono or stereo phono plug).



VR320 with three 16-channel telephone boards



VR320 with two 8-Channel "audio" boards

Figure 2-1. VR320 Connections

2-3. INITIAL TURN-ON.

NOTE

The VR320 is factory-configured for the line voltage of the country of installation. Fuse size is 2A, 250V. Refer to paragraph 2-7 for ensuring correct power.

2-3.1 Power. The VR320 does not have an ON/OFF switch. To apply power, first plug the power cord into the rear panel power connector. Next, plug the other end of the cord into a power outlet. The logger turns on and operates continuously when plugged in.

2-3.2 Self Test. After power is applied, the unit performs a self test, ending with a display of the unit serial number and software version. If this isn't already filled in on page 1-2 of this manual, write it in now.

2-3.3 Front Panel Controls. There are three sets of controls on the VR320 front panel. These keys are lit when active. The transport control keys are immediately underneath the drive(s). The keypad is on the right of the panel above the headphone jack and volume control. The function and soft keys are underneath the LCD display. Refer to Section III of this chapter for a more detailed description of the front panel controls and indicators.

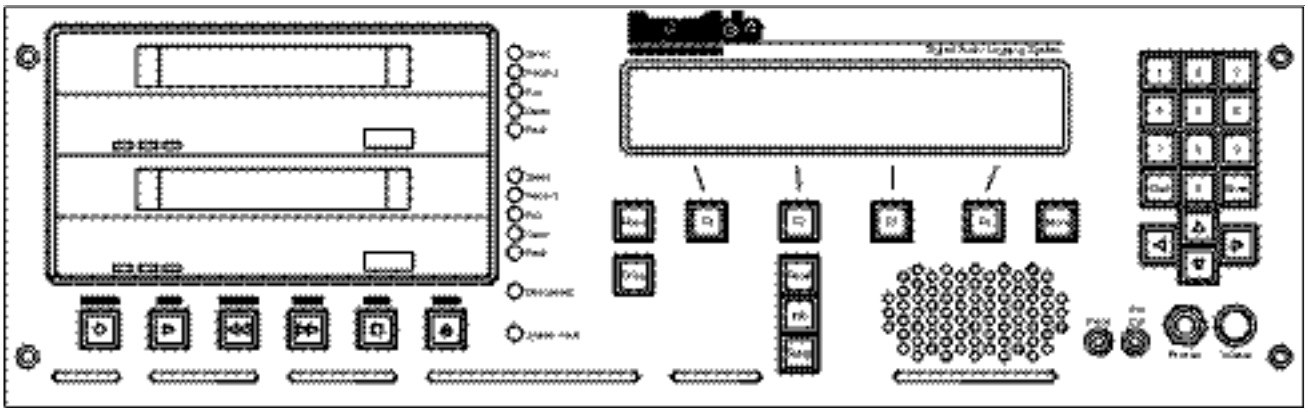
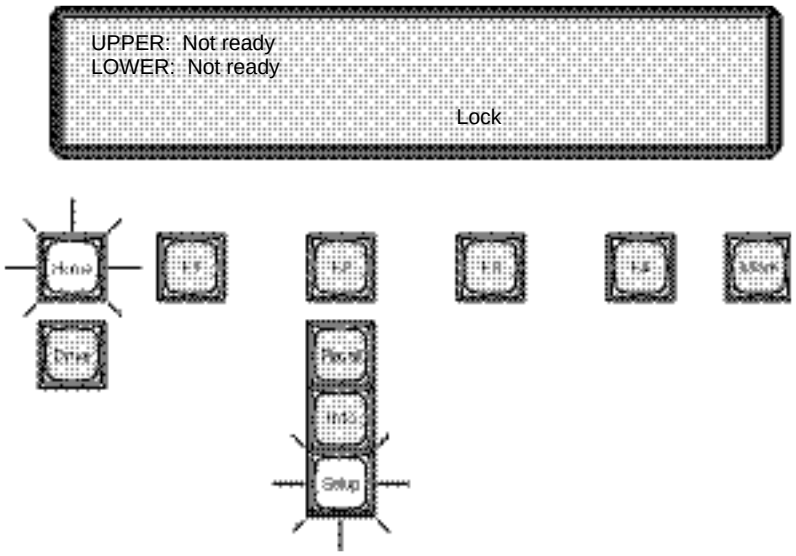


Figure 2-2. VR320 Front Panel

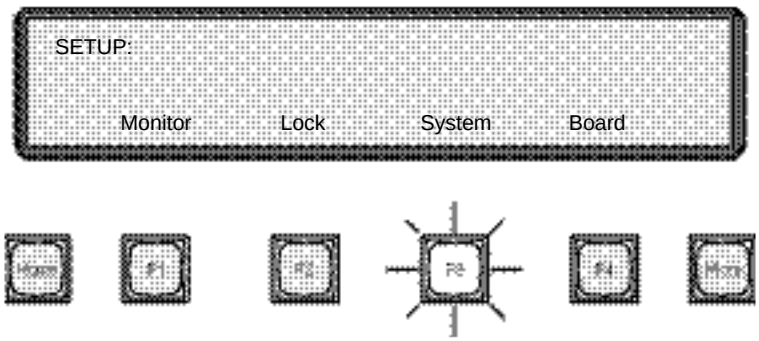
2-3.4 Clearing The Hard Drive (Clear Disk). By clearing the hard drive as the first procedure after initial turn-on, you erase any signals recorded on the hard drive that may have occurred during factory testing.

a. Press the **Home** function key. This ensures that your are starting out at the “Home” screen. See the following sequence of screens.

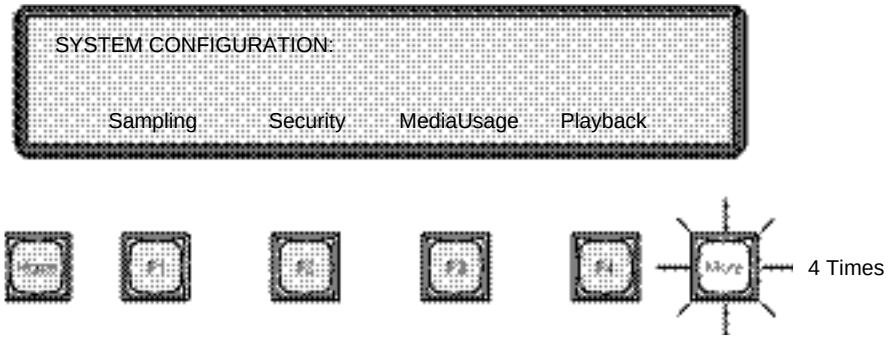
b. Press the **Setup** function key.



c. Press **F3** (the **System** soft key).

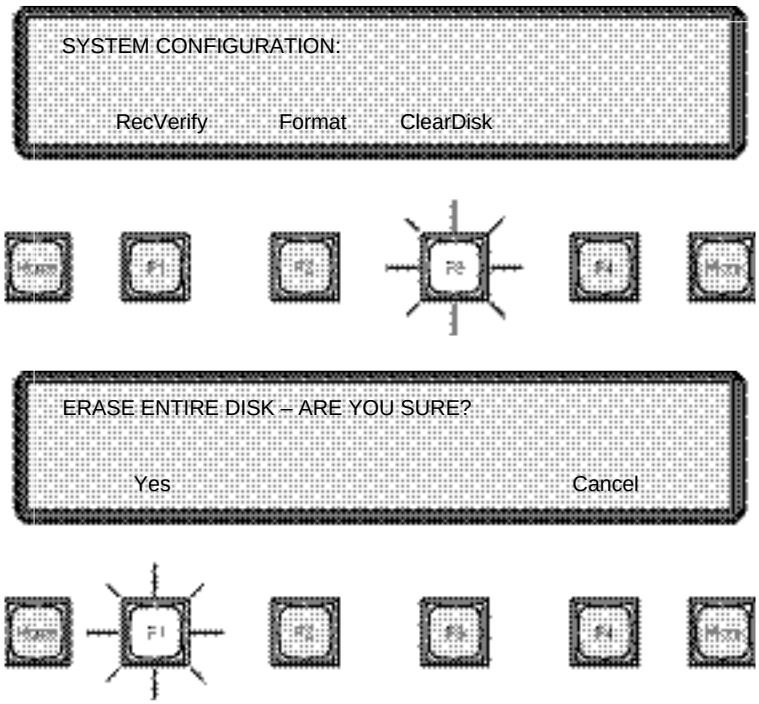


d. Press the **More** function key *four* times to get to the last (fourth) menu for SYSTEM CONFIGURATION.



e. Press **F3** (the **ClearDisk** soft key).

f. Erase the disk by answering the question on the screen. Press **F1** (the **Yes** soft key) to erase the disk.



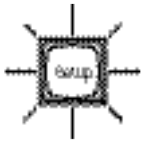
2-3.5 Setting the System Clock.

a. Press the **Home** function key. This ensures that you are starting out at the "Home" screen.

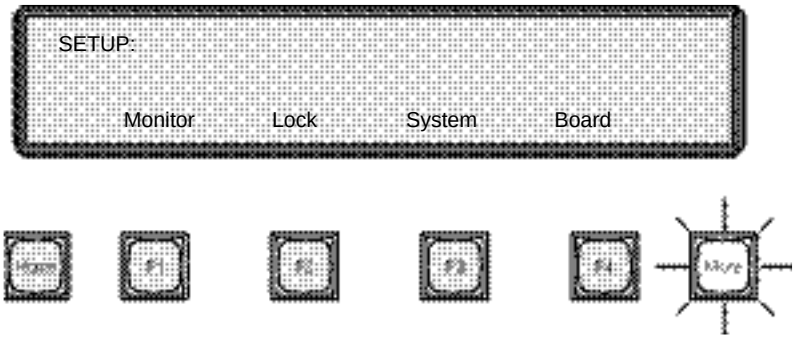
NOTE

Note that the VR320 automatically reverts to the "Home" screen after approximately one minute. This will prevent leaving the unit in an unfamiliar state for a new operator. Whether the unit "timed out" or you hit the **Home** function key, the menu originally displayed upon turn-on should now be on the LCD.

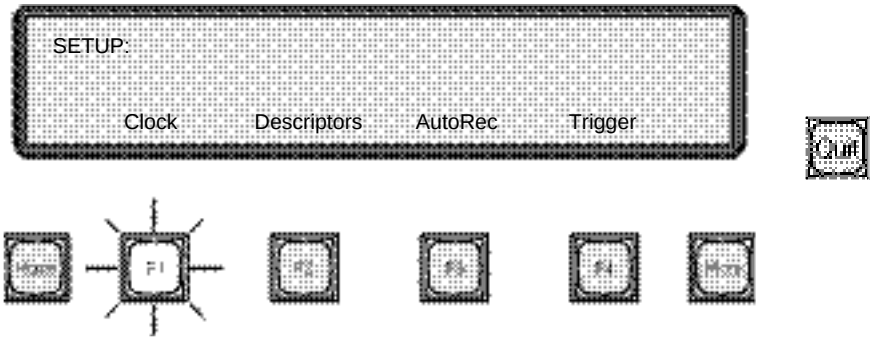
b. Press the **Setup** function key.



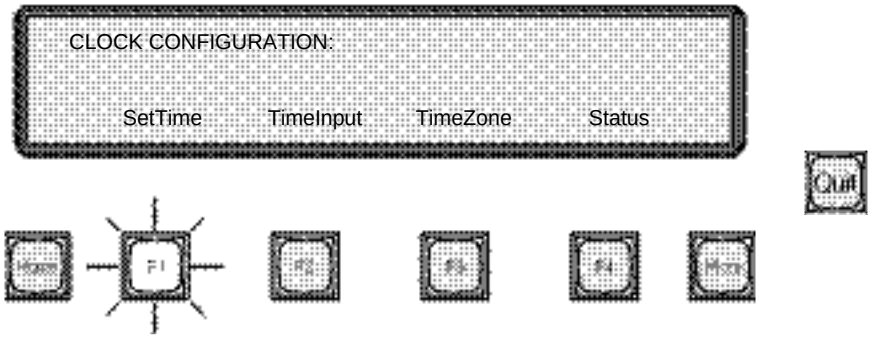
c. Press the **More** function key.



d. Press **F1** (the **Clock** soft key).



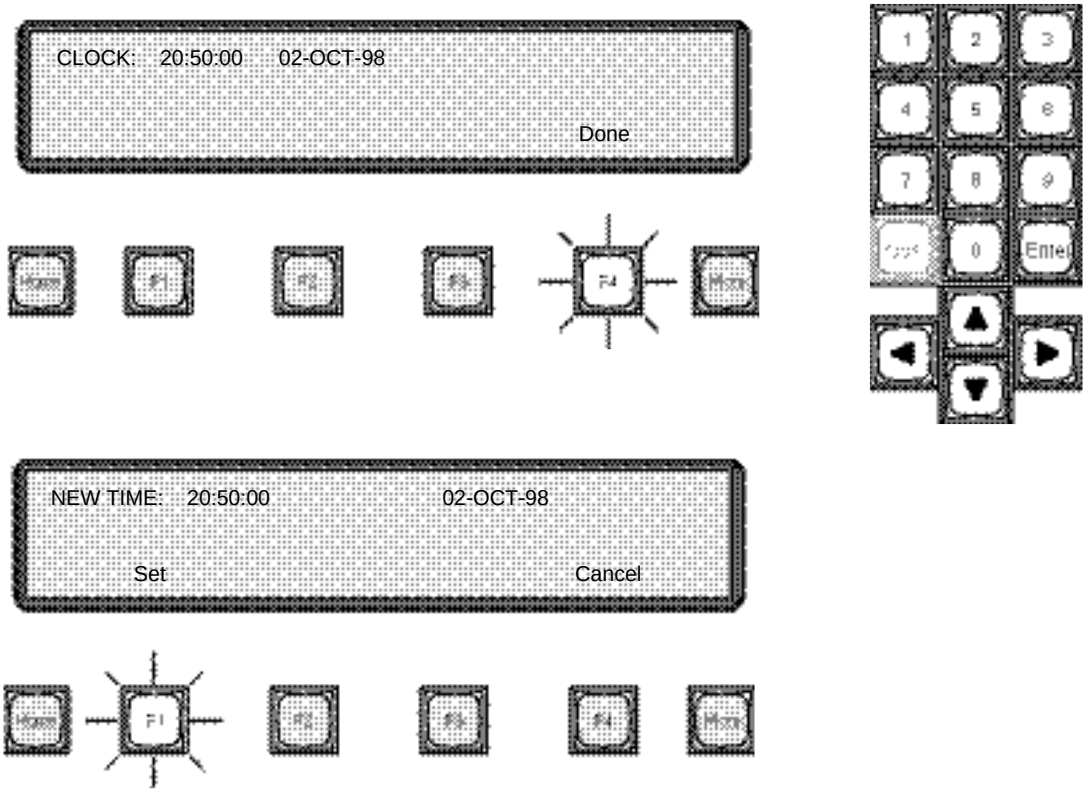
e. Press **F1** (the **SetTime** soft key).



NOTE

The display will give you the time and date as stored in the VR320. This may be accurate, or completely incorrect if never set. Use the up, down and side-to-side arrow keys under the keypad to set the time and date. The side-to-side arrows will move the cursor, the up and down arrows change the number above the cursor. The VR320 uses 24-hour time and the “European” method of giving the date as DAY/MONTH/YEAR.

f. Determine what the time and date will be in about a minute. For example, if it's now 8:49 PM on the 2nd of October, 1998, the number for 8:50 PM would be "20:50:00 02-OCT-98". Punch in that number on the keypad and then hit the **Done** soft key. The display will now show the time and date as you've set it. Wait for the second hand to come around to the minute and hit **F1** – the **Set** soft key. (Or, if you made a mistake, hit **Cancel** and start over.) The clock is now set. If you are running on Greenwich Mean time or UTC, you can set the clock to that instead of local time.



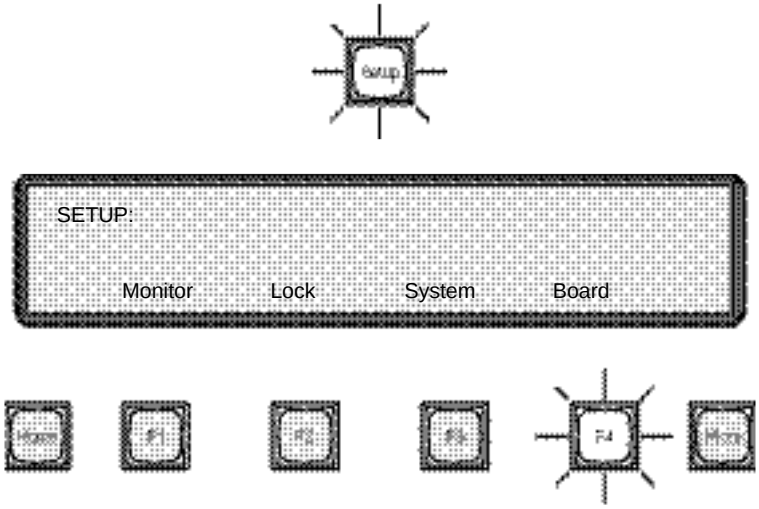
2-3.6 Setting Up Input Channel 1 for Recording.

a. Press the **Home** function key (if the system has not timed-out back to the “Home” screen).

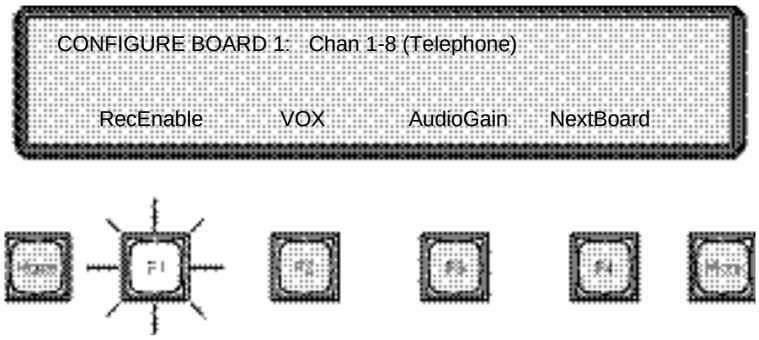
b. Press the **Setup** function key, then press **F4** (the Board soft key).

NOTE

This gives you several choices including RecEnable (Record Enable).

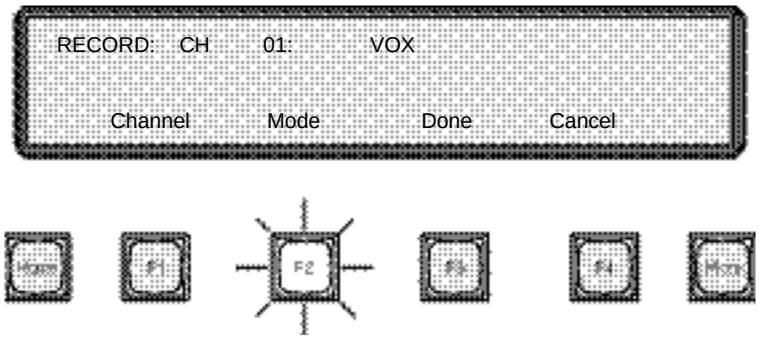


c. Press **F1** (the **RecEnable** soft key) and you will see a display for board 1: CH1: followed by a mode description.

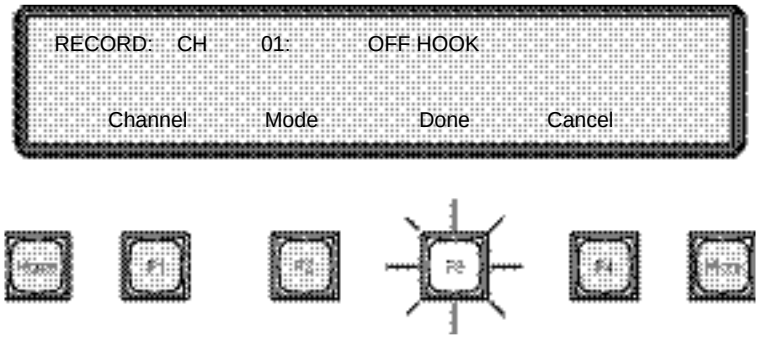


d. Press **F2** (the **Mode** soft key) and cycle through all the choices. Continue to cycle through the choices until **OFF HOOK** (for telephone input boards) is displayed (if it was not displayed originally).

For audio input boards, set the RecEnable to INPUT: ACTIVE HIGH/OPEN.



e. Press **F3** (the **Done** soft key) to accept the **OFF HOOK** (telephone input boards) choice or ACTIVE HIGH/OPEN (audio input boards). There are many more system configuration choices, but the only important one at present is to make sure that Channel 1 is active when you record on it.



NOTE

By now, you have accomplished two things: You have set up the VR320 so it will be able to do its job, and you have learned much of what you need to know to operate it. The rest of this familiarization exercise will be less detailed.

2-3.7 **<u>Media Loading and Formatting.</u>** Before you can record on a drive, the media must be FORMATTED. This process writes an index and some machine-specific information on the media. The index is used to find specific times when searching, and also serves as a permanent identification if, for some reason, the physical label or box is missing. Recording will continue on the internal hard disk during the format process. You can format on either drive or both drives simultaneously.

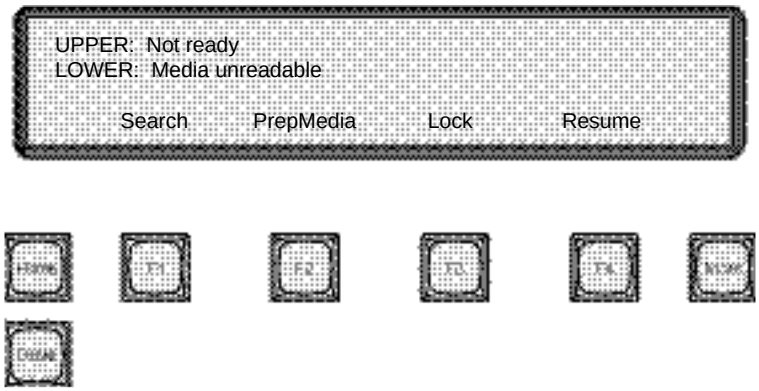
<u>Loading and formatting 4MM and 8MM data cartridges;</u>

Be sure to use only *data grade* tapes. All DAT cartridges have a “write protect” mechanism, a small plastic latch that covers a hole on the back of the cartridge (except 8mm). The latch must cover the hole to allow the media to be written. Make sure this is the case before continuing. On 8mm data cartridges, make sure the hole is uncovered. Insert your new tapes in the VR320 by putting them in the slots, transparent side UP, write protect latch towards you, until a gentle resistance is encountered as the tape is almost fully inserted. Apply just enough pressure to overcome the resistance, and the drive will pull the tape in and begin the loading process.

Loading and formatting magneto-optical disks and rewriteable DVD-RAM:

Magneto-optical disks and DVD-RAM come packaged in a protective case. The whole case is loaded into the machine at once; do not try to remove the disk from the case. You will see a small plastic "write protect" mechanism located on the bottom left of each side of the protective case. The latch must be pushed all the way to the right (two red holes showing) to allow the disk to be written. Make sure this is done before continuing. Insert your new magneto-optical disks in the VR320 by putting them in the slots, either side up, with the write protect latch toward you, until a gentle resistance is encountered as the disk is almost fully inserted. Apply just enough pressure to overcome the resistance, and the drive will pull the disk in and begin the loading process. Unlike a DAT cartridge, the magneto-optical disk will record on both sides. When one side is full, turn the disk case over and reinsert it.

The LCD display will show the loading process for either the UPPER or LOWER drive. If you are using new, unformatted media, the display will show **Unreadable**. (If the display shows either drive to be **Ready**, it means that you have inserted formatted media. Since formatting destroys all data on the media, make sure that it does not have any important information on it before proceeding.)



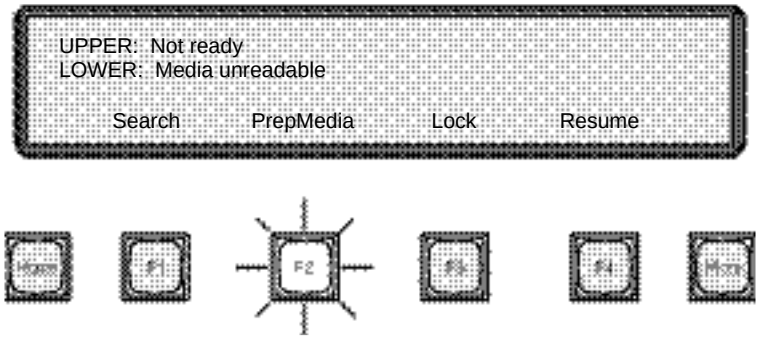
All new tapes and magneto-optical disks must be formatted before they can record. This takes about 4 minutes for a 4MM or 8MM DAT and a few seconds for a magneto-optical disk. You do not need to reformat the media to reuse it.

Follow this procedure to format new media:

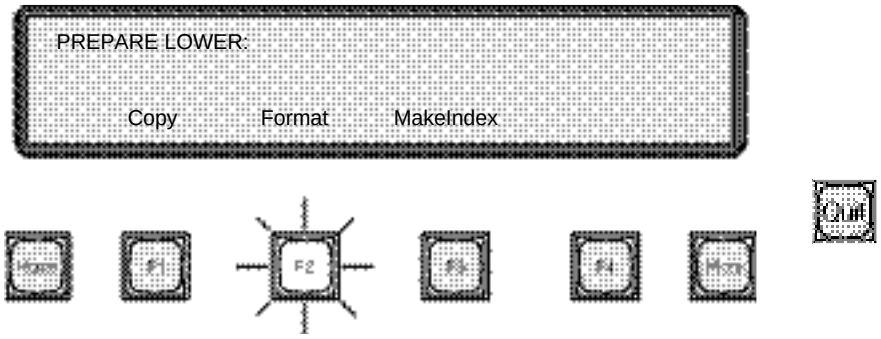
a. Press the **Home** function key ensuring the "Home" screen is displayed.

b. Place an unformatted *Data Grade* DAT or magneto-optical disk into an available drive. The drive status display will read **Media unreadable**. Use the Drive key to select this drive. (See the Drive Status LEDs in Section III of this chapter, paragraph 2-10).

c. Press **F2** (the **PrepMedia** soft key).

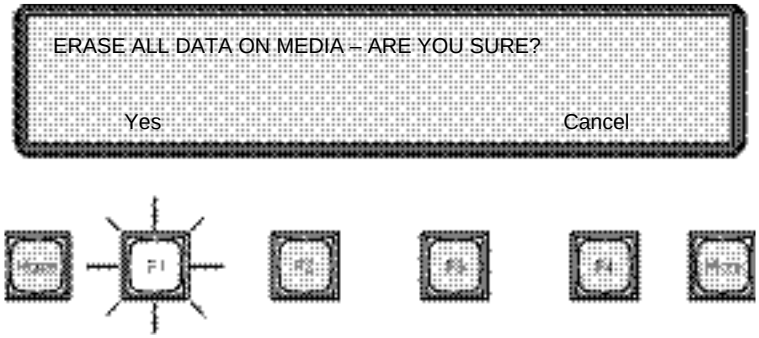


d. Press **F2** again (the **Format** soft key).

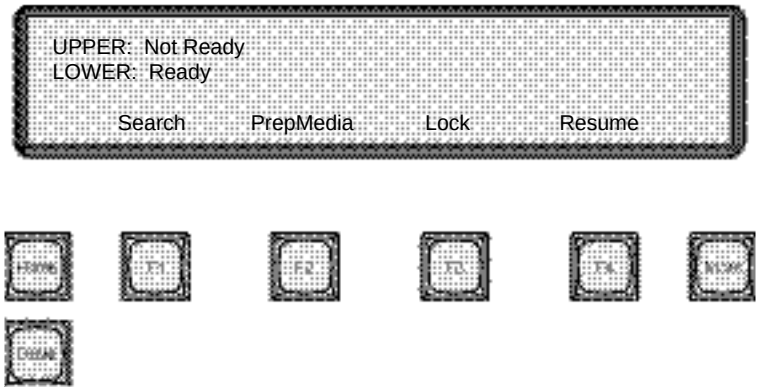


e. The display will read 'ERASE ALL DATA ON MEDIA – ARE YOU SURE?"
Press **F1** (the **Yes** soft key).

(Notice that you were given the opportunity to **CANCEL** this potentially dangerous operation.) To format the media in the other drive, press the **DRIVE** function key until the Select LED is lit for the other drive and repeat the operation. (Both operations can be performed concurrently.)

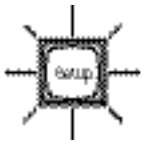


Now that the media in the drive is formatted, notice another characteristic of the VR320. The menus are sometimes dependent upon the state of the unit. The loading of media caused new menu choices to become available.

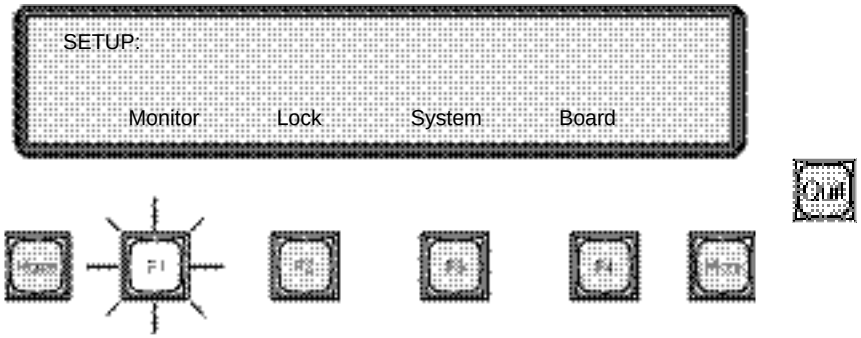


2-3.8 <u>Recording to the Drives</u>. Once the formatted media is in one or both drives, the VR320 is ready to record.

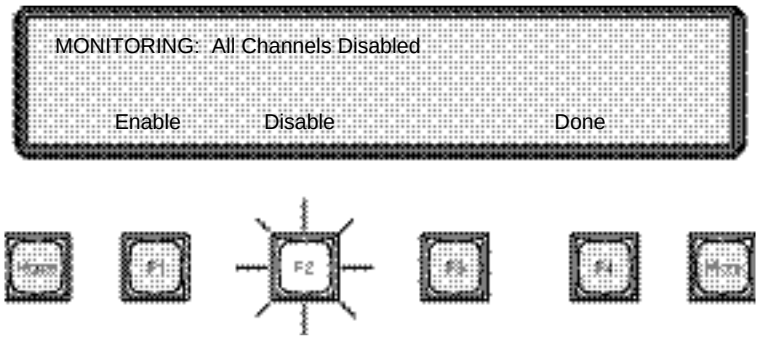
a. Press the **Setup** function key.

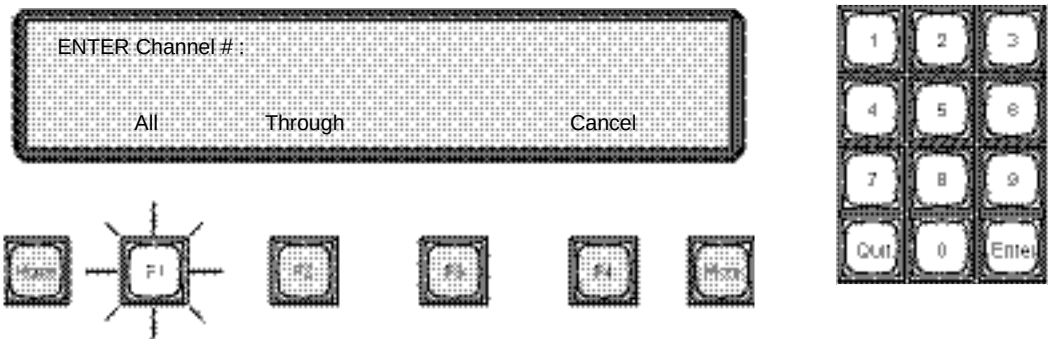


b. Press **F1** (the **Monitor** soft key).

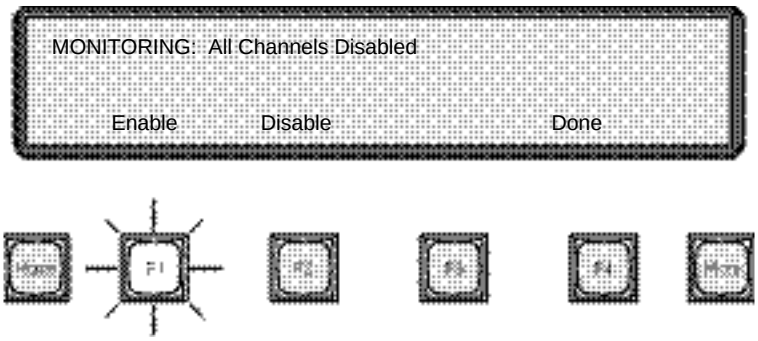


c. Press **F2** (the **Disable** soft key). Then press F1 (the **All** soft key).

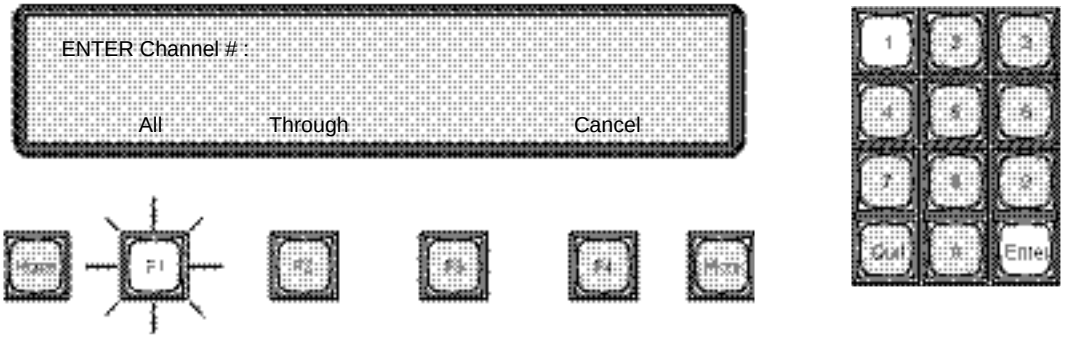




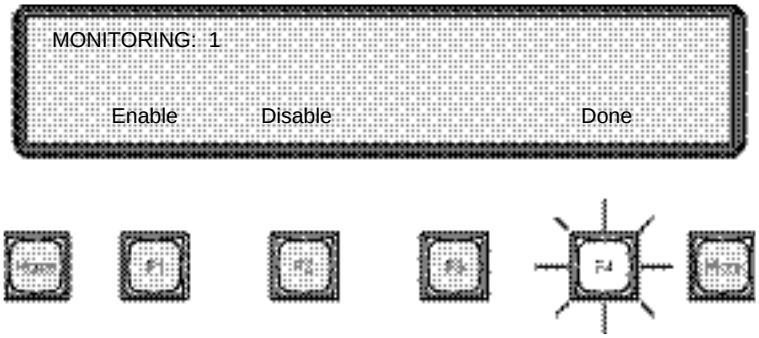
d. Press **F1** again (the **Enable** soft key).



e. Press the number “1” on the keypad followed by the keypad **Enter** key.



f. Press **F4** (the **Done** soft key).



If your signal source is not on, turn it on now. The top row of the display serves as a level indicator. Adjust the output level of your signal source so that the input signal to the VR320 is as high on the "meter" as possible without "clipping", as indicated by the asterisks going all the way to the right of the display. It is OK if the rightmost set of asterisks flashes occasionally. (When the **Monitor** menu times out or you hit **Done**, the "meter" is disabled, and that line of the display reverts to its normal function, described in detail later on.) You can now hear your signal source through the VR320 speaker.

Use the volume knob located under the keypad to adjust the speaker (or your headphone) volume.

Press the **Home** function key to return to the main menu and note that your drives are now **Ready**. When you see **Ready**, it means that the transport controls are active. All you need to do to record now is to hit the **Record** transport key. The display will ask you to confirm if you wish to record on the selected drive (look to see that the Drive Select LED is lit next to the desired drive, if not, use the **Drive** function key to select the appropriate drive). Then press **F1** – the **Record** soft key. The display now shows (a) that you are recording, and (b) the status of the drive(s). The date and time is also displayed, along with the "media counter", an electronic equivalent of the mechanical counter on analog decks. This counter is very important because it may be the only way you can tell how near the media is to completion. Let the recording run for a while.

Once you start recording, the menu structure changes. Note that when the recording drive is selected, the display gives you options that make sense while recording. Pressing the **More** function key will give you access to additional menu options.

Some of the menu choices you have while in the record mode include:

Monitor Listen to what is being recorded as it is occurring.

SetMem (Set memory) Save the location of the message on the medium so you can go back to that spot later.

SaveMessage Store a critical communication into one of 16 record buffers.

Time Adjust Allows you to "spring ahead" to daylight savings time. Eventide recommends that you do not change the clock for daylight savings time. If you set the clock ahead in the spring, you may have trouble in the fall. Setting the clock back will result in two hour-long sections of media with the same time, making searching difficult.

ChanStat (Channel status) An alternate view of channel activity.

Lock Used to prevent unauthorized access to all controls except instant recall.

It is possible to record on both drives simultaneously. You can do this either by selecting the non-recording drive with the **Drive** function key and hitting **F4** (the **Resume** soft key), or, if both drives are loaded and positioned for recording, hitting the **More** function key and **F1** (the **DualRec** soft key).

Section II. INSTALLATION

2-4. INTRODUCTION.

This section describes the factors that must be considered in setting up the VR320 in your facility. Consideration of the appropriate physical location must be made for available power and audio sources. This includes connecting the unit to power, audio, and ancillary items (i.e., clock, label printer).

2-5. PLANNING.

Identify and allocate the inputs to be used as the signal sources for the VR320. Then determine if you have any channels remaining. If you do, bring them to a convenient patch field as you will probably find other applications for the VR320 in the future.

Determine the physical location for the VR320. The unit has removable rack mounts and can be installed in any convenient location that meets the temperature specifications for the unit and the drives. (If you are going to mount it in a rack, do not rely only on the mounts for support – use a shelf or slide as well. The weight of the unit will exert significant torque on the mounting hardware.) Some items to consider:

Convenience Select a location where changing media can be easily accomplished. If you do not plan to install remote alarms, locate the VR320 where the media almost-full, media full, and system fault alarms can be clearly heard.

Security Do you need to be concerned that someone will want to "destroy the evidence," so to speak? If so, how dedicated will that person be? The unit has security features, but a well-locked door is better!

Power The Uninterruptable Power Supply will allow the unit to run briefly on batteries while the generator comes up. If you have a generator, make sure the VR320 will be powered by it.

Accessibility Will people continually be using the unit for playback, or will it almost always be making archival recordings?

Wiring If almost all the signal sources are in one area, how much wiring do you want to do to get to the recorder?

Environment For best reliability, the unit should be placed in a room with comfortable (for humans) temperature, no extremes of humidity, and as little dust or particulate matter as possible. A "no smoking" area is preferable.

2-6. SYSTEM CONNECTION.

Figure 2-1 shows the rear panel of the VR320. There can be up to six telephone or audio input connectors, depending upon the number of optional channel boards installed. Your primary job will be to connect the input channels to your signal sources. Additional tasks include providing power, audio output, and, if desired, PC remote control, and printer interface signals and connections.

2-7. POWER CONNECTION.

AC Line This connector provides power to the VR320 using the power cord provided. The chassis connector is internationally standardized. However, if the VR320 is being used outside the United States, the supplied power cable must be replaced with a local version.

Line Voltage The VR320 is factory-configured for the line voltage of the country of installation. Fuse size is 2 amp, 250V.

If unsure that the power input setting is correct for the local supply, perform the following:

a. Remove the top cover (Figure 2-3) as follows:

(1) Remove fifteen #4 screws.

(2) Remove five #6 screws.

(3) Lift and remove the cover.

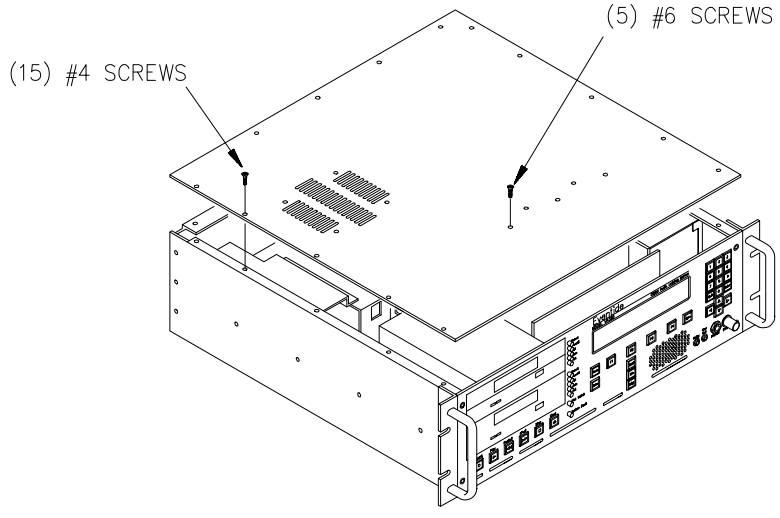


Figure 2-3. Removing Top Cover

b. Select the correct position of the voltage selector switch on the power supply module (see Figure 2-4).

- Pushing the switch in the UP position is for 115V ac.
- Pushing the switch in the DOWN position is for 230V ac.

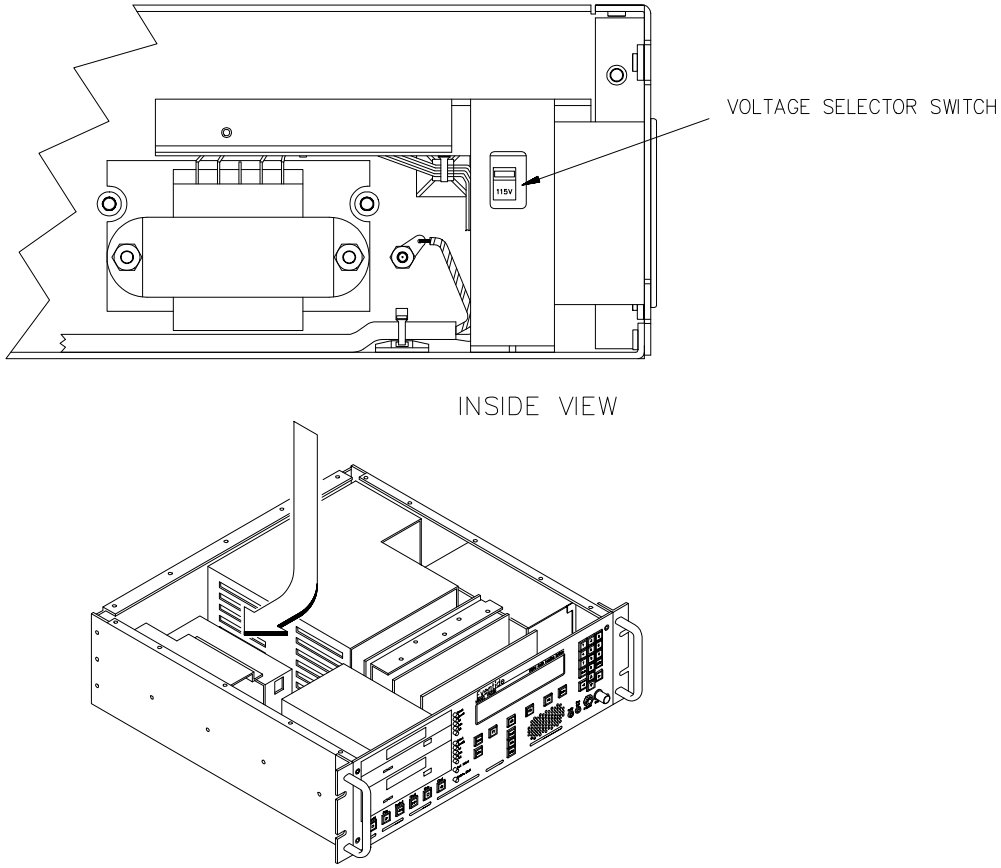


Figure 2-4. Voltage Selector Switch

c. Replace the top cover (Figure 2-3) as follows:

(1) Position top cover on the top of the VR320.

(2) Install five #6 screws.

(3) Install fifteen #4 screws.

NOTE

Connect signal sources and mount the VR320 prior to connecting the power source to the unit. Refer to initial turn-on (paragraph 2-3).

2-8. INPUT OPTIONS.

Up to three input boards may be installed in each VR320 mainframe (see Figure 2-2). This manual describes the three board styles available.

1) Voice-quality audio input board (8 channels).

2) FCC-registered telephone board (8 channels).

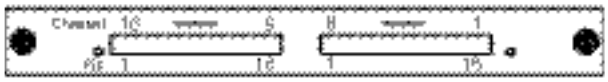
3) FCC-registered telephone board (16 channels).

Other types of input boards (Hifi, T1/E1) are described in supplements.

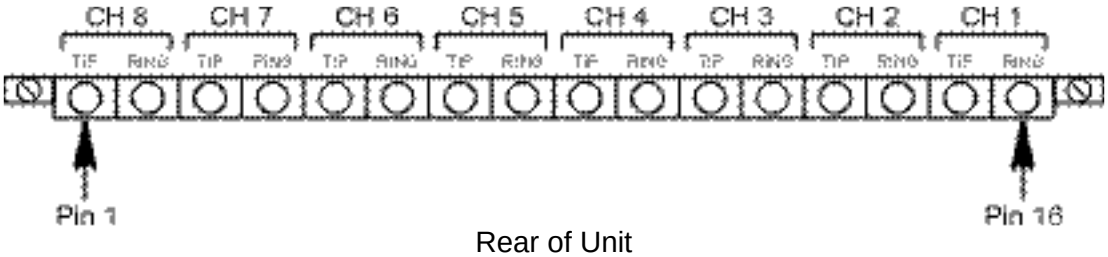
2-8.1 <u>Connecting the Telephone Channel Inputs.</u> The connector comes with mating plugs. The mating plugs use crimp type screw terminals to secure the telephone lines (wires). Looking at the rear of the unit, each 16-position connector is numbered as follows:

01	Line 8 “tip”
02	Line 8 “ring”
03	Line 7 “tip”
04	Line 7 “ring”
05	Line 6 “tip”
06	Line 6 “ring”
07	Line 5 “tip”
08	Line 5 “ring”
09	Line 4 “tip”
10	Line 4 “ring”
11	Line 3 “tip”
12	Line 3 “ring”
13	Line 2 “tip”
14	Line 2 “ring”
15	Line 1 “tip”
16	Line 1 “ring”

8 - Channel Telephone Board



16 - Channel Telephone Board

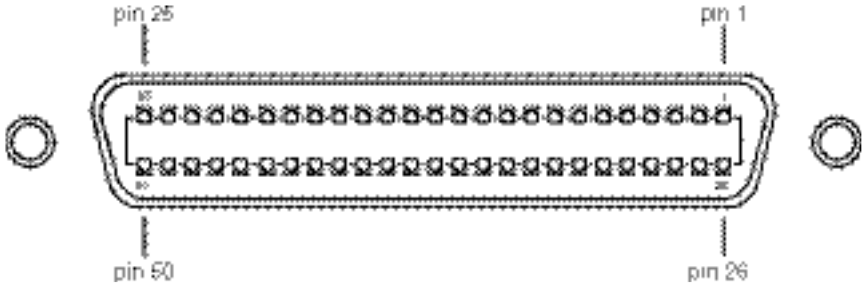


Rear of Unit

2-8.2 <u>Connecting the Audio Channel Inputs.</u> There is one 50-position socket on the rear panel of each audio input board. The sockets are the industry standard telephone type, compatible with the Amphenol 57-series (“blue ribbon”) connectors. Looking at the rear of the unit, each 50-position socket is numbered as follows:

25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01

50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26



For each of the eight channels on an input board, there are six signals available at the 50-position socket: two signals for differential audio input, one for audio output, one for squelch or record enable control, and two grounds. If there are three input boards installed, the top board contains channels 1-8, the middle board contains channels 9-16, and the bottom board contains channels 17-24. Standard 25-pair color-coded cables may be used for system connections according to the following table 2-1:

Table 2-1. Rear Panel Audio Connector Pin-Out

PAIR	PIN	COLOR	SIGNAL	BOARD: CHANS	Top 01-08	Mid 09-16	Bot 17-24
1	26 1	WHT/blu BLU/wht	Audio in – Audio in +	Channel	01	09	17
2	27 2	WHT/org ORG/wht	Audio out Ground				
3	28 3	WHT/grn GRN/wht	Squelch Ground				
4	29 4	WHT/brn BRN/wht	Audio in – Audio in +	Channel	02	10	18
5	30 5	WHT/slt SLT/wht	Audio out Ground				
6	31 6	RED/blu BLU/red	Squelch Ground				
7	32 7	RED/org ORG/red	Audio in – Audio in +	Channel	03	11	19
8	33 8	RED/grn GRN/red	Audio out Ground				
9	34 9	Red/brn BRN/red	Squelch Ground				
10	35 10	RED/slt	Audio in – Audio in +	Channel	04	12	20
11	36 11	BLK/blu BLU/blk	Audio out Ground				
12	37 12	BLK/org ORG/blk	Squelch Ground				
13	38 13	BLK/grn GRN/blk	Audio in – Audio in +	Channel	05	13	21
14	39 14	BLK/brn BRN/blk	Audio out Ground				
15	40 15	BLK/slt SLT/blk	Squelch Ground				

PAIR	PIN	COLOR	SIGNAL	BOARD: CHANS	Top 01-08	Mid 09-16	Bot 17-24
16	41 16	YEL/blu BLU/yel	Audio in – Audio in +	Channel	06	14	22
17	42 17	YEL/org ORG/yel	Audio out Ground				
18	43 18	YEL/grn GRN/yel	Squelch Ground				
25	50 25	VLT/slt SLT/vlt	(not used) (not used)				

Color Legend:

WHT = white	VLT = violet	BRN = brown
RED = red	BLU = blue	SLT = slate
BLK = black	ORG = orange	WHT/blu = white wire with blue stripe
YEL = yellow	GRN = green	

2-8.3 Squelch Requirements. A “high” is either an open circuit, or a voltage level greater than 4 volts. A “low” is either a contact closure to ground or a voltage level lower than 2 volts.

2-8.4 Audio Board Front-End Options. The following options are configurable from the front panel on a channel-by-channel basis:

1) Balanced input, >10K ohm impedance, transformerless

2) Transformer balanced input, >10K ohm impedance @ 1kHz

3) Transformer balanced input, 600 ohm impedance

WARNING

Do not connect Audio Board channels directly to the Public Switched Telephone Network. Use Eventide’s FCC-registered input boards for this purpose.

2-8.5 Rear Panel Serial Port Connectors. Connect the desired ancillary items (clock, label printer, status printer, etc.) to the rear panel serial port connectors. Refer to Figure 2-5.

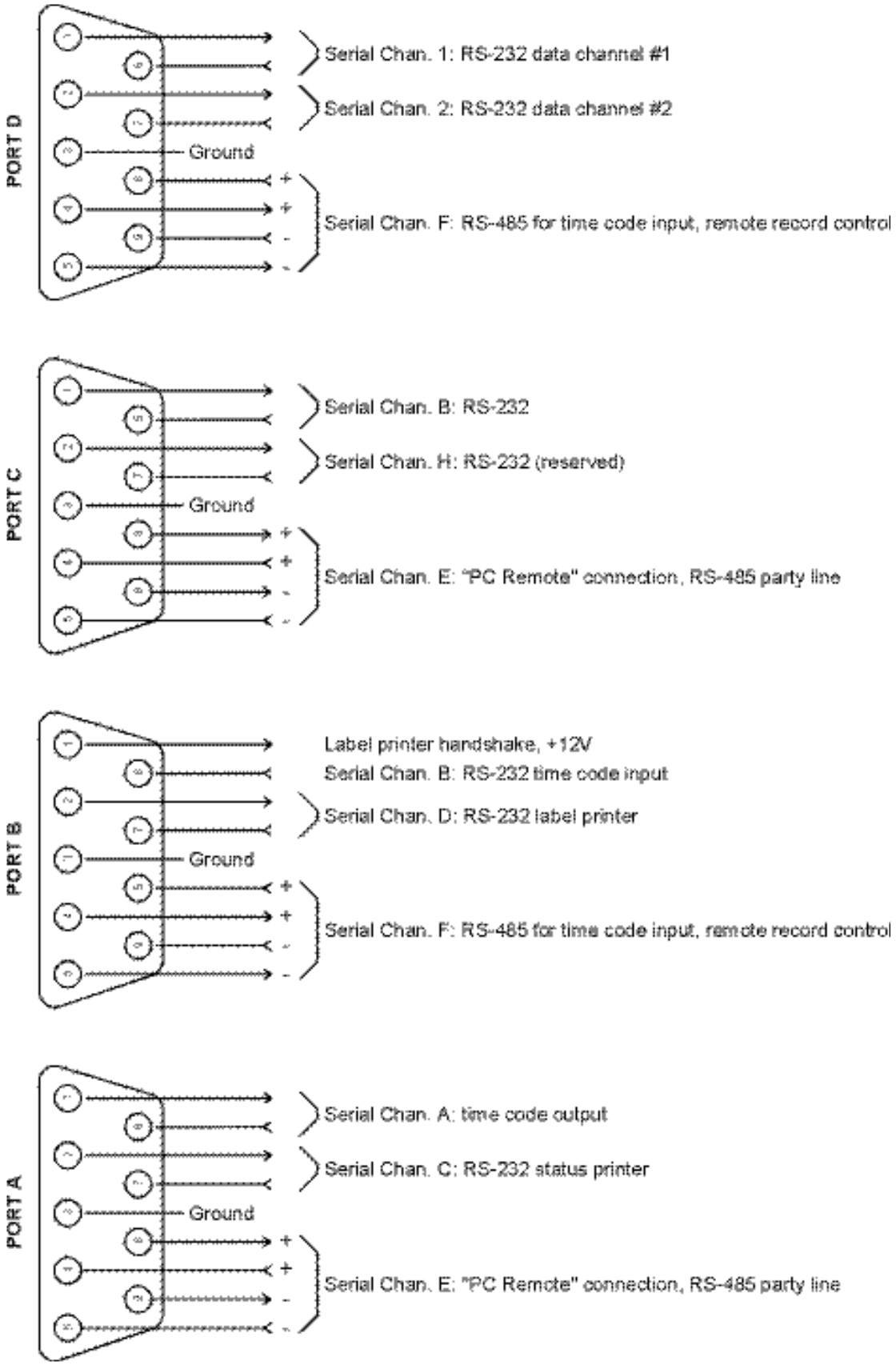
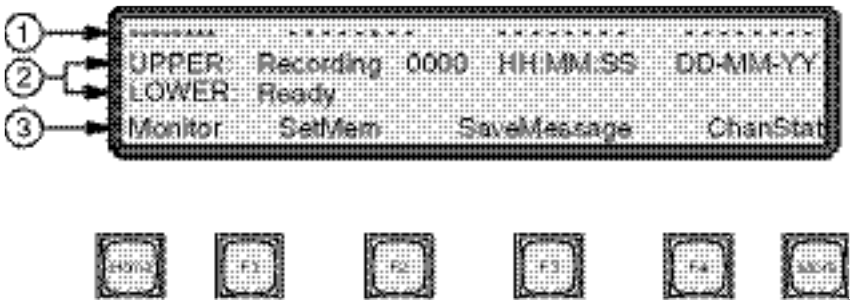


Figure 2-5. VR320 CPU: Rear Panel Serial Port Connectors

Section III. FRONT PANEL CONTROLS AND INDICATORS

Previously, Figure 2-2 illustrated the three sets of controls on the VR320. This section describes the front panel controls and indicators in more detail.

2-9. HOME SCREEN.



This is the status or "Home" screen of the VR320. Return here at any time by pressing the "Home" soft key. You will automatically return here from all other screens after the time-out period has passed (approximately one minute for each menu level selected). Table 2-2 describes the display and controls of the "Home" screen shown above.

Table 2-2. Home Screen Description

ITEM	CONTROL OR INDICATOR	DESCRIPTION
1	Channel Status Indicators	Each character represents an available channel. In this example, 32 channels are available with channels 1-8, 10, and 14 currently recording. The channel status indicators during playback are: "+" Channel is active (data currently exists for the channel). "-" Channel is enabled for playback. "*" Channel is active and enabled (i.e., channels playing back). Channel status indicators during record are: "*" Channel is enabled and active and not monitored. "-" Channel is enabled and inactive and not monitored. "M" Channel is enabled and monitored. " " Channel is NOT enabled and monitored.

Table 2-2. Home Screen Description – (Continued)

ITEM	CONTROL OR INDICATOR	DESCRIPTION
2	Drive Status Lines	The drive status lines let you know what each drive is currently doing. In this example, the upper drive status line shows the upper drive in the record mode. Also shown is a media usage counter for that drive, and the current time and date. The lower drive status shows this drive ready to begin recording when the media in the upper drive is full or when activated by the operator.
3	Soft Keys	A maximum of four functions are displayed on this line. Each function corresponds to a soft key located directly under the display. The soft keys are numbered **F1** through **F4**. From this screen, pressing **F1** will put the logger into Monitor mode, **F2** will activate the SetMem (set memory) feature, **F3** will store material in the "SaveMessage" buffer, **F4** provides **ChanStat** (channel status). In some instances, more functions are available than can be shown at one time. When this is the case, the **More** function key will be illuminated. Press the **More** function key to step through additional menu selections.

2-10. DRIVES.

Table 2-3 describes the Drive Controls and Indicators.

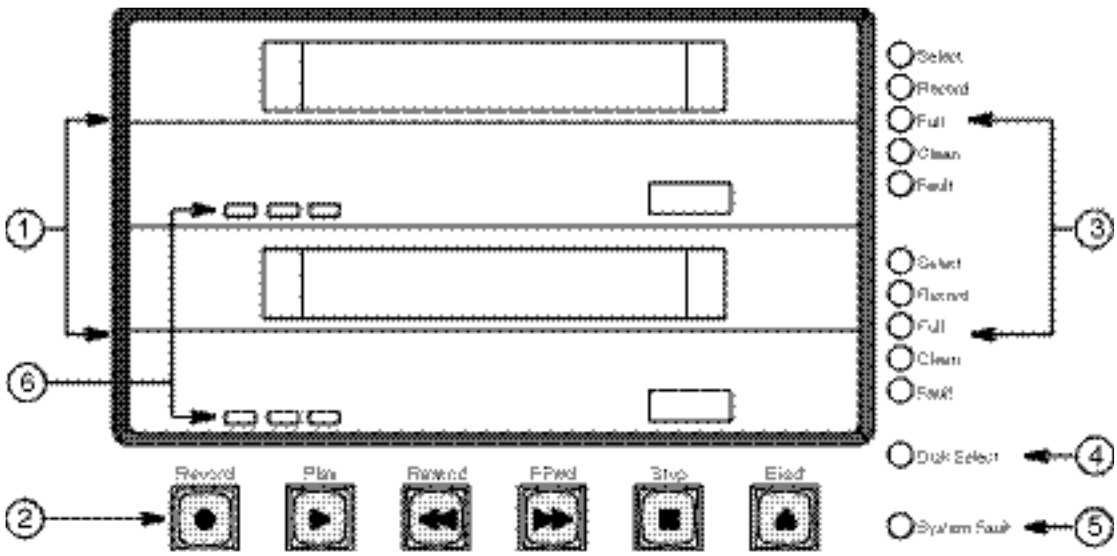


Table 2-3. Drive Controls and Indicators

ITEM	CONTROL OR INDICATOR	DESCRIPTION
1	Drives	These devices may be either 4MM DAT, 8MM Exabyte cassette, rewriteable DVD-RAM, or magneto-optical disk. The VR320 logger may be equipped with a single drive or, more commonly, with dual drives.
2	Transport Controls	You may use these controls to operate both the drives and the internal hard disk. The speed of the rewind and fast forward functions can be increased by pressing the Rewind and FFwd (fast forward) transport keys multiple times.
3	Drive Status LEDs	These LEDs will light as required to report the current state of the drive or the media. They will light under the following conditions: *Select* – A green light indicates that the drive has been selected for playback, record, or any other function. Select a drive (or the hard disk) by pressing the "Drive" hard key when it is illuminated. *Record* – A red light indicates that the drive is recording. *Full* – A yellow light indicates that the media in that drive has one half hour or less of record time available. *Clean* – A yellow light indicates that it is time to clean the DAT drive with a dry-type, data-grade cleaning tape. The light will go out after you reset the cleaning timer (refer to paragraph 5-3). This function is extremely important to ensure the long life of your DAT drive. Note: Optical disk and DVD-RAM drives do not require cleaning. *Fault* – A yellow light indicates that a drive failure has occurred. It may also indicate that the "clean" light has been ignored.
4	Disk Select	A green light indicates that the internal hard disk has been selected for playback, live monitor, etc. Select the hard disk by pressing the **Drive** function key.
5	System Fault	A yellow light here indicates a malfunction that is preventing the logger from recording.
6	Media Drive Indicator Lights	Different tape and disk units have their own indicator lights. In most cases, ignore these lights. In general, the VR320 display provides more and better information.

2-11. SOFT KEYS AND FUNCTION KEYS.

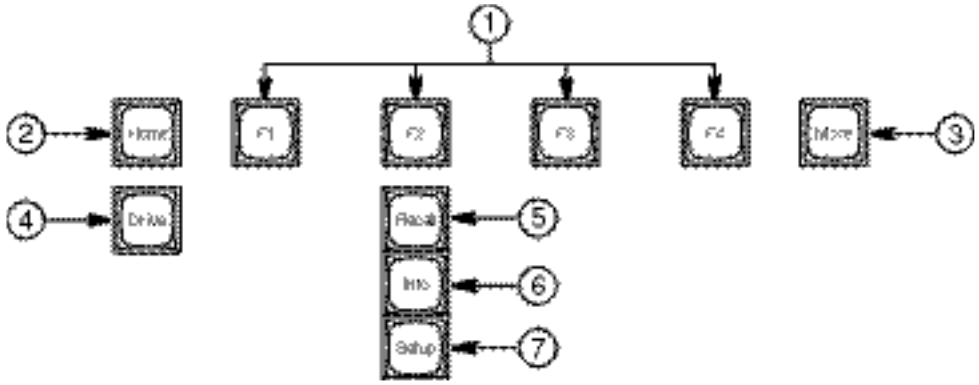


Table 2-4. Function and Soft Keys Description

ITEM	CONTROL OR INDICATOR	DESCRIPTION
1	Soft Keys	Numbered F1 through F4, these keys correspond to the commands located directly above them on the display screen.
2	Home Key	Press this key any time it is illuminated to return directly to the Home Screen (see paragraph 2-9).
3	More Key	In certain modes, there will be more functions available than can be displayed on the screen at one time. When this is so, the **More** key is illuminated. Press this hard key for access to those additional options.
4	Drive Key	Press this key when control of either drive or the hard disk is desired. With each press of this key, the **Disk Select** LED or one of the drive "Select" LEDs is illuminated indicating that it is selected.
5	Recall Key	Press this key to initiate the Instant Recall function. Refer to paragraph 5-25 for a description of Instant Recall.
6	Info Key	Press this key for information on system status, drive status, or hard disk status. The controls for printing a label are also found here.
7	Setup Key	Pressing this key selects the configuration screen. Here you have access to such commands as setting the clock and adjusting audio inputs. Note: Access to the configuration screen is not available when the unit is recording.

2-12. KEYPAD, FRONT PANEL PORTS, SPEAKER, AND VOLUME CONTROL.

Table 2-5 describes the front panel controls and ports.

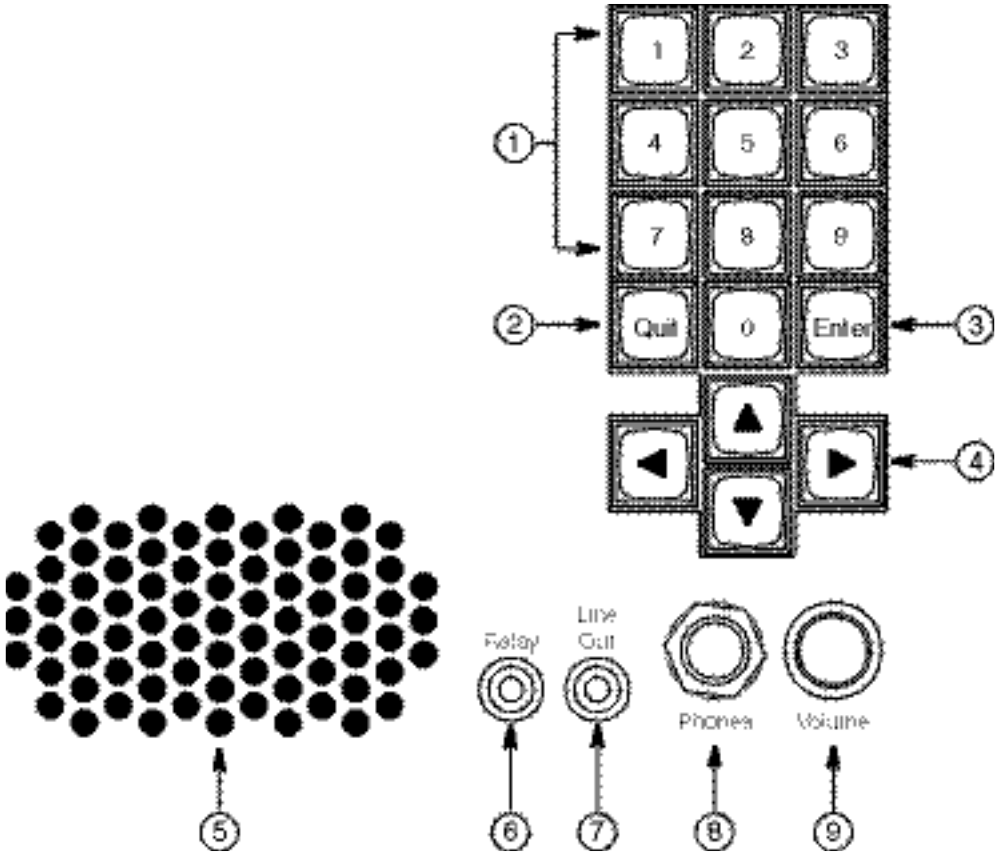


Table 2-5. Front Panel Controls and Ports Description

ITEM	CONTROL OR INDICATOR	DESCRIPTION
1	Numeric Keypad	The keypad can be used in place of the soft keys when entering numbers in the VR320. This will prove convenient when entering a time and date for a search or selecting a channel to monitor or play. The keypad is also used to enter a password.
2	Quit	When illuminated, this key will cancel a command or end a session. It is often an alternative to using **F4** – the **Cancel** or **Done** soft key.
3	Enter	When illuminated, this key is used to tell the VR320 to accept the number entered in by the keypad. It is often an alternative to **F4** – the **Done** soft key.

Table 2-5. Front Panel Controls and Ports Description – (Continued)

ITEM	CONTROL OR INDICATOR	DESCRIPTION
4	Arrow Keys	Use the left and right arrow keys when you wish the cursor on the display to move sideways. The up and down arrow keys will scroll through numeric options that appear on the display as well as channel selection and setup parameters. These keys are often an alternative to the arrow soft keys which appear on the display.
5	Speaker	The playback and monitor speaker is located on the front panel, behind these holes.
6	Relay	The relay jack can be used to trigger a remote alarm. It can also be configured in conjunction with the line out jack for use with a stop/start, hand-held or other external cassette recorder.
7	Line Out	Use this jack to dub recorded material to an external cassette deck. You may also use this jack to listen through mini-plug equipped headsets, however, the line output jack volume cannot be adjusted.
8	Phones	Headphone jack for ¼" phone plug equipped headsets. The volume of this output is adjusted by the front panel volume control knob.
9	Volume Control Knob	Use this knob to control the speaker or headset volume during playback.

CHAPTER 3
THEORY OF OPERATION

Section I. PHILOSOPHY OF OPERATION

3-1. GENERAL.

While the VR320 is similar in some ways to ordinary tape recorders, many of its features are unique to logging recorders in general and digital logging recorders in particular. This section explains aspects of the VR320 that may not be obvious, but with which you should be familiar in order to make the best use of the unit's capabilities.

NOTE

Most of the following discussion involves a comparison between analog and digital recording to tape. Once a signal is converted to digital form, recording amounts to simply storing data on the media (whatever it is). Therefore, much of the discussion applies to any type of media, including magneto-optical disks and DVD-RAM.

3-2. COMPROMISES IN LOGGING RECORDERS.

Ordinary recorders are judged mainly for sound quality, and are rarely called upon to record more than an hour at a time. Logging recorders are judged mainly for the ability to fit as much material as possible on a given amount of tape, and are rarely called upon to play more than an hour at a time. When we do listen to a logging recorder we listen for content and intelligibility rather than "audiophile quality." A logging recorder is a compromise, trading sound quality for quantity.

3-3. ANALOG vs. DIGITAL RECORDING.

In analog tape recording, audio is stored by magnetizing the tape in direct proportion to the audio signal. While this process can achieve excellent quality, anyone who has made a copy of a copy knows that some degradation is inevitable. The magnetization process is not precise, and any variation in tape speed is audible as unsteadiness in the sound.

To maximize sound quality in an analog recorder, you run tape at a high speed and you keep the tape tracks as wide as possible while maintaining separation to avoid crosstalk; in other words, you use a lot of tape. To maximize recording time and channels you do exactly the opposite: run the tape slowly and jam as many tracks as you can across the width of the tape; in other words, you use as little tape as possible. Reducing the amount of tape used to record an audio signal is like using very grainy photographic film: the image (audio) becomes very fuzzy (noisy).

In digital recording, as used on the VR320, the audio signal is measured at regular intervals and converted to numbers. Instead of relying on the amount of magnetization on the tape to accurately represent an audio signal, digital recording relies on the magnetization to represent only two values – zero and one – needed to support binary numbers. Using the comparison with photography again, we can say that with digital recording we can tolerate very "grainy film" since we only need to distinguish light (one) from dark (zero). As long as we can store and reproduce the ones and zeros without error, the quality of the resulting audio depends on how we use the numbers.

To maximize sound quality in a digital recorder, you measure the audio signal very precisely and very often; in other words, you use a lot of tape. To maximize recording time, you cut back on accuracy and don't measure so often. Audio quality is traded off, but with digital recording there is 1) more control, 2) no degradation when making digital copies, 3) no wow or flutter, and 4) no crosstalk from tape "tracks" too close together.

3-4. AUDIO QUALITY CONSIDERATIONS AND TRADEOFFS.

Audio quality in a tape recorder is usually determined by several measurable quantities:

- Frequency Response
- Dynamic Range
- Signal-to-Noise Ratio (SNR)
- Total Harmonic Distortion plus Noise (THD+N)
- Wow and Flutter
- Crosstalk

3-5. FREQUENCY RESPONSE.

Frequency response is the range of frequencies over which a machine can record and reproduce a sine wave such that the reproduced signal has the same relative amplitude as the input signal. "High fidelity" audio equipment should have a frequency response of 20Hz-20kHz ±1dB. It is commonly agreed that a frequency response of about 200-3000 Hz is necessary to faithfully reproduce human speech.

In an analog recorder, frequency response is directly proportional to tape speed, and is also related to the type of tape and the design and condition of the tape heads. It is truly remarkable how good a standard audio cassette deck can sound considering the tape speed is only 1 7/8 inches/second and that the format was designed for voice recording. Professional analog tape recorders used for music run at 15 or 30 inches/second.

In a digital recorder, frequency response is directly proportional to sampling rate, or the number of times per second that the analog signal is converted to a number. To the extent that each number requires a certain amount of space on the tape, the frequency response of a digital recorder is also directly proportional to tape speed. The Nyquist Sampling Theorem states that the sampling rate must be greater than twice the highest frequency you want to process.

3-6. SAMPLING RATE IN THE VR320.

In the VR320, the recording time of a tape depends on the "sampling rate" chosen via the front panel. We chose the term "sampling rate" because it is more obviously related to digital audio than "transcoding rate", which is a more accurate term. When you select a "sampling rate", the actual sample rate does not change, and neither does the frequency response. What does change when you change the "sampling rate" from the front panel is actually the *data rate*, or the amount of digital information per channel that is stored on tape.

The input signals are sampled at 8000 times per second, and each sample occupies 8 bits. When you select a rate of 64kbps, you are selecting 8000 samples per second times 8 bits per sample, which is 64000 bits per second, or 64 kilobits per second. When you select 32kbps, you are selecting 8000 samples per second times 4 bits per sample. Likewise, at 16kbps you are selecting 2 bits per sample. The VR320 doesn't simply throw away bits to get the lower data rates. Various DSP operations are performed to eliminate redundant information in the audio signal.

3-7. DYNAMIC RANGE, SNR, AND THD+N.

Dynamic range is the ratio in dB of the largest undistorted signal to the smallest signal that can be heard above the noise. For analog tape recorders, the largest signal is limited by tape saturation and the smallest signal is limited by tape hiss. For digital systems, dynamic range is determined by the largest number that a sample can be, which depends on the number of bits in each sample.

Various tricks can be played to increase dynamic range. For analog signals, dynamic range expander circuits can make loud signals louder and soft signals softer. Similar tricks are possible with digital signals, which we play with numbers instead of voltages. The VR320 uses 8-bit samples, but these samples are *nonlinear*. The 8-bit samples used in the VR320 actually have a dynamic range equivalent to 13-bit linear samples, but the 13-bit values are especially coded into 8-bit quantities.

Signal-to-noise ratio is the ratio of the largest undistorted signal to the noise level with no signal present. This is not the same as dynamic range. There may be 2mV of noise voltage in an analog system, but it may be possible for a human to detect a 1mV audio signal even with the noise there; in this case the dynamic range would be 6dB greater than the SNR. The situation is even stranger for digital signals. Each sample is an approximation of an analog voltage. The more bits per sample, the better the approximation, but there is always some error, which is perceived as a combination of noise and distortion. You can measure the noise level in a digital audio system with no signal present, and this can be very quiet indeed, but to properly state the SNR of a digital audio system you must take the average sampling error into account. A 4-bit system may be nearly silent with no input signal, but as soon as there is a signal you'll hear quite a bit of noise.

THD+N is measured by applying a pure sine wave to the input of the system under test and subtracting a pure sine wave from the output; whatever is left over is the distortion plus noise. Harmonic distortion by itself is that part of the output which is harmonically related to the input sine wave with the fundamental subtracted. Distortion is visible on an oscilloscope if the output waveform doesn't look like a sine wave. A common and severe form of distortion is clipping, which is visible as a flattening of the peaks of an audio waveform. In analog systems, clipping may be rounded and may actually sound pleasant up to a point. In digital systems, clipping means that the input to the analog-to-digital converter is above the maximum; the largest sample value is not large enough to serve as a measurement of the input signal. When reproduced, the waveform from a

clipped digital signal is perfectly flat where the peaks could not be properly sampled, resulting in a very unpleasant sound.

3-8. WOW AND FLUTTER.

In an analog recorder, wow and flutter are caused by variations in tape speed due to lack of mechanical precision, and they get worse as the absolute speed of the tape decreases. To avoid unacceptable wow and flutter, the tape mechanism must be kept meticulously clean and aligned. How much wow and flutter can be tolerated depends on the application. If the goal is to listen to a section of a recording and transcribe it, significant amounts can be tolerated. If the goal is to reproduce and analyze critical signals, even tiny amounts can seriously degrade the signal.

Because digital recording uses electronic clocking of its input and output, and electronic signals are much more precise than mechanical devices, a digital recorder like the VR320 will have so little wow and flutter that it will be unmeasurable. Digital audio is stable as long as the sampling interval is precise while recording and playing. Once sampling is done, steady timing is not important until the audio must be reproduced. During the recording process, each channel is sampled every 125 microseconds. Samples from all channels are accumulated in memory until a certain number is reached, at which time the accumulated samples are copied to tape at high speed. Playback is the reverse: every few seconds a large number of samples is copied from tape into memory; samples are then taken from memory, separated into the original channels, and converted to analog one at a time every 125 microseconds. Think of a bucket of water with a small hole in the bottom: water (samples) will drip out of the bucket (memory) at a fairly constant rate whether there is one inch or several inches of water in the bucket. This type of operation explains why the tape in the VR320 does not move steadily.

3-9. CROSSTALK.

In an analog machine, channel separation is achieved by recording different channels on different areas of the tape, called tracks. There is always a compromise in tape head design: the closer together you put the heads, the more tracks you can get on a tape, but the greater will be the crosstalk between channels.

The VR320 has only one physical “track”. Along with the number representing audio samples, the VR320 adds time and channel information so that when the tape is played back the samples are sent to the proper output channels The only crosstalk in the VR320 is a result of proximity of electronic circuitry, and is easy to control.

3-10. DEGRADATION.

With continued use, analog recorders degrade in an analog fashion. The frequency response gets poorer, and wow and flutter increase. As the tape head wears, it becomes harder to align the mechanism for proper performance, and audio quality suffers.

While digital recorders also physically degrade in an analog fashion, their performance doesn’t suffer in the same way. Rather, the “error rate” increases. In most cases this doesn’t affect the

signal quality at all. Instead, the amount of tape used increases to prevent the reproduced signal from losing integrity. Since the tapes have a built-in margin, this problem doesn't become evident until that margin is seriously encroached on. At that time, the drive must be realigned and serviced. As with analog recorders, continued high performance requires periodic cleaning of the tape heads.

3-11. TAPE USAGE.

The VR320 uses technology similar to that used in video recorders—the tape speed necessary for recording high-density information is obtained by using a rotating tape head. This increases the information storage density many fold over a fixed-head machine. This, along with the efficiency obtained by not wasting tape on unused channels, is responsible for the drastic decrease in tape usage and tape storage requirements of the VR320.

In an analog recorder, each channel is assigned to a separate track on the tape. The same amount of tape is used whether one channel is active or all channels are active. That's a lot of waste.

The VR320, however, "multiplexes" all channels onto a single data track. When there is no active signal on a channel, there is no data for that channel on the tape. Therefore, if only two channels are active, an 8-channel VR320 will use tape only one fourth as rapidly as an 8-channel analog recorder. This, along with the rotating head technology, digital signal processing, and the nature of the tape itself, is what allows us to record so many hours on such a small tape.

Section II. THE VR320 CHANNEL HOUR CAPACITY

3-12. THE "CHANNEL HOUR".

The VR320's capacity is measured in channel-hours: the number of hours of a single channel that can be recorded on one tape (see Table 3-1). That number, for a 120 meter DDS-2 cassette, is about 520 hours, or some 21 days. Of course, if you record more than one channel at a time, the tape will fill faster.

For example: You are recording your broadcast station 24 hours a day. You also are recording two additional morning shows 4 hours per day each. How long will the tape last? 24 plus 4 plus 4 equals 32 channel hours every day. You are entitled to 520 channel hours per tape, which comes out to 16.25 days.

In this example, you will need to change the tape every 16.25 days. As a matter of convenience, you would probably want to change it at the same time every 16 days or perhaps every 2 weeks, ignoring the trivial waste involved. Recording more sources adds to the channel-hour load, and you might find a tape lasting from a few days to more than two weeks.

Table 3-1. Eventide Logging Recorder
Channel Hours* of Storage Chart

	Models VR320, VR240, VR204			**VR320HF, VR240HF, VR204HF**		
Bandwidth	3.4kHz	3.4kHz	3.4kHz	3.5kHz	7kHz	14.4kHz
Sample Rate	8kHz	8kHz	8kHz	8kHz	16kHz	32kHz
Compression Rate	16kbps	32kbps	64kbps	32kbps	64kbps	128kbps
DATA GRADE DAT	**CHANNEL HOURS**			**CHANNEL HOURS**		
DDS-1 90M DAT - 2GB	285	142	71	142	71	35
DDS-2 120M DAT - 4GB	570	285	142	285	142	71
DDS-3 125M DAT - 12GB	1720	860	430	860	430	215
8MM CARTRIDGES	**CHANNEL HOURS**			**CHANNEL HOURS**		
112 Meter Cartridge - 5GB	715	357	178	357	178	89
160 Meter Cartridge - 7GB	1000	500	250	500	250	125
REWRITEABLE DVD-RAM	**CHANNEL HOURS**			**CHANNEL HOURS**		
5.2 GB DVD-RAM	745	372	186	372	186	93
MAGNETO-OPTICAL DISK	**CHANNEL HOURS**			**CHANNEL HOURS**		
3.5 Inch MO Disk - 640MB	92	46	23	46	23	11
5.25 Inch MO Disk - 2.6GB	372	186	93	186	93	46
5.25 Inch MO Disk - 4.6GB	659	329	164	329	164	82
5.25 Inch MO Disk - 5.2GB	745	372	186	372	186	93
INTERNAL HARD DISK	**CHANNEL HOURS**			**CHANNEL HOURS**		
2GB Hard Disk (standard)	285	142	71	142	71	35
4GB Hard Disk (optional)	570	285	142	285	142	71
9GB Hard Disk (optional)	1290	645	322	645	322	161

*Channel Hour equals one (1) channel recording continuously for one hour

3-13. HARD DISK DRIVE.

Each VR320 comes standard with an internal hard disk drive. As of the time of writing (Nov 98), the standard hard disk drive capacity is 2GB. The precise definition of GB (gigabyte) depends on the drive manufacturer. Everyone agrees that a KB (kilobyte) is 1024 bytes, but some say that a MB

(megabyte) is 1000KB, some say it is 1024KB, and some might say it is 1,000,000 bytes. In this manual we say 1MB = 1024KB. In the VR320, each 100MB of storage on the hard disk drive represents about 14.5 channel-hours.

The VR320 stores the most recently recorded audio material on the hard disk drive. This provides three major operational benefits:

1) You can listen to material from the hard disk drive without disturbing tape drive operation ("instant recall" is simply a quick way to start playback from the hard disk).
2) If the VR320 runs out of tape, you have several hours of time to change tapes without any loss of material.
3) If you need to listen to material that is not on the hard disk, you can suspend recording on a tape drive, use the tape drive for playback, and resume recording without losing anything.

Another benefit of the hard disk drive in the VR320 is that it prolongs the life of the tape drives. Here's why: a DDS tape drive is either "streaming" (recording data on tape at a *fixed rate* of about 500KB per second) or it is stopped. If you back up your computer's disk drive to a DDS tape, you computer reads files from your disk (which is much faster than a tape drive) and sends them to the tape drive as fast as the tape drive can accept the data; a 1GB disk drive takes about 30 minutes to copy, and the tape "streams" the entire time, only stopping when the copy is finished. This is what the tape drive is designed for. In a logging recorder, the average rate of data from active channels is much less than the tape drive's streaming rate, which means the tape drive must start and stop many times before a tape is full. In the VR320, the hard disk is used to manage the data to maximize streaming and minimize the number of starts and stops, which prevents excessive wear of the tape transport. Eventide loggers provide this benefit – other loggers do not.

Section III. VR320 THEORY OF OPERATION

3-14. MAIN COMPONENTS.

The main components of the VR320 are:

Input Boards (signal conditioning, A/D and D/A conversion, data reduction)
CPU Board (microprocessor, memory, SCSI, clock, Ethernet, communication ports)
Removable-media Drives (tape, MO disk, DVD-RAM)
Internal fixed hard disk drive
Motherboard (backplane for CPU and Input boards, audio mixer)
I/O Control Board (audio output and display control circuits)
Front Panel Assembly (keyboard, display, status indicators)
Switching Power Supply
Uninterruptible Power Supply with Battery Charger

3-15. GENERAL OPERATION.

NOTE

The following description assumes that standard telephone input boards are installed.

Signals to be recorded are connected to the input boards. The front-end circuits condition the signals according to user settings for gain and AGC. The conditioned signals are filtered and converted from analog to digital. The digitized signals are pass through a data reduction algorithm (standard G.726 ADPCM), resulting in a data rate per channel of 64, 32, or 16 kilobits per second. Data from all channels is transferred from the input boards to memory on the CPU3 board. A decision is then made for each channel whether to save the data or ignore it, depending on the user setting for channel activity (OFF-HOOK, VOX, etc.). Data for active channels is transferred from memory to the fixed hard disk drive. After a certain amount of data is accumulated on the disk drive, it is then transferred from the hard disk to memory and then to the removable media. If the removable media is full or not loaded, data continues to accumulate on the hard disk. All data is time coded so the user can easily locate desired material by searching for a time and date.

Playback is the reverse of recording. Once the desired data is located (either on the hard disk or on a removable-media drive that is not in record mode), the data is transferred to memory and then to the input boards for playback. The data is converted to analog, and the signals from all enabled channels are mixed to a single channel and played through the speaker (or headphones) and the line-out jack.

The CPU board features a Motorola 68000-family microprocessor running a proprietary real-time multitasking operating system. System firmware is stored in Flash ROM and can be updated in the field. Updates are created periodically to add new features and to support different types of SCSI removable-media drives (such as the new DVD-RAM drives).

The VR320 can be controlled from the front panel or it can be operated remotely via RS-232, RS-485, or Ethernet. Several connectors on the rear panel provide access to various functions including remote control, time code input/output, and outputs to a label printer and status printer.

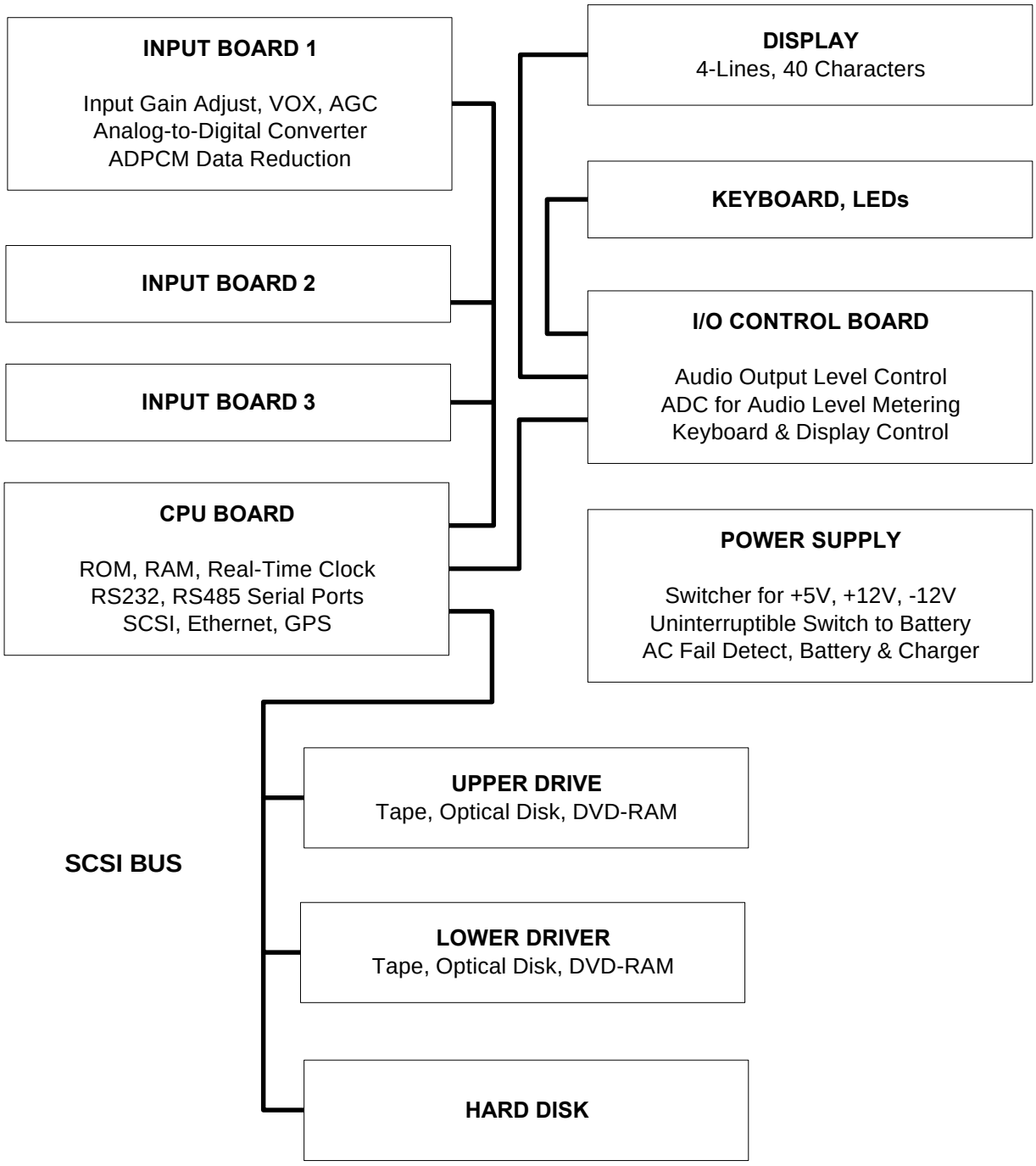


Figure 3-1. VR320 General Block Diagram

3-16. CONCLUSION.

This chapter has attempted to explain the philosophy behind the VR320 digital logger. We hope that by knowing how the unit works you will not be surprised when the operation is not quite the same as an analog machine, and we hope you will come to appreciate the benefits of digital logging.

CHAPTER 4
ERROR CODES

4-1. GENERAL.

This chapter contains the various error codes generated by the VR320.

4-2. ERROR CODE DESCRIPTIONS.

Under certain circumstances, the VR320 will generate error codes such as “e0003” or “e0020”. These codes appear only in the error log and perhaps the history log. The codes are there to help factory engineers pinpoint problems that may require design changes. Error codes may be added or deleted or the circumstances under which they are generated may change as new revisions of system firmware are developed.

If one of the codes is generated, there is usually an obvious symptom such as a system restart or failure of a drive to record or play back or even accept media. Most of the codes indicate problems with the Small Computer Systems Interface (SCSI) operations. These problems mean that either a drive or the SCSI controller or other related hardware is malfunctioning. The system will usually reset the drive and return it to a known state, but if the problem persists some repair work will be needed. Other codes indicate memory problems serious enough to cause the system to be reset, again meaning a probable need for repair. The following listing provides a description of the error codes.

Table 4-1. VR320 Error Codes

ERROR CODES	MESSAGE	DESCRIPTION
e0001	Tired of waiting for access to SCSI controller	When trying to start a SCSI command, the SCSI controller was not available. Either the other drive is using the SCSI controller or a command on the same drive is taking too long.
e0002	Waiting for IRQ after “no reselect”	Before trying to select a drive in preparation for a SCSI command, the SCSI controller was told not to allow itself to be selected. The controller did not respond to this command.
e0003	SCSI selection timeout	The SCSI controller tried to select a drive to start a SCSI command, but the drive did not respond.
e0004	Selection sequence problem	An unexpected status code was reported by the SCSI controller after trying to select a drive.

Table 4-1. VR320 Error Codes – (Continued)

ERROR CODES	MESSAGE	DESCRIPTION
e0005	Waiting for IRQ after “select”	There was no response from the SCSI controller after trying to select a drive.
e0006	Unexpected SCSI bus phase	The drive asked for an unexpected type of SCSI bus transfer. This error may occur using a new type of drive. It may be that certain drives behave in unexpected ways under certain circumstances and a firmware revision may be needed to handle the unexpected situation.
e0007	Drive tried to transfer more than expected	The drive asked for a data transfer after the SCSI controller reported that the data transfer was complete.
e0008	Odd transfer count	All data transfers over the SCSI bus are expected to involve an even number of bytes. If a transfer is completed or suspended after an odd number of bytes, this error is generated.
e0009	Bad link	This indicates a memory allocation problem due to a memory error.
e0010	Incomplete block transfer	A SCSI command involving the transfer of blocks resulted in a partial block transfer.
e0011	Odd memory address	This indicates a memory error.
e0012	Waiting for IRQ after data out DMA	The SCSI controller did not respond after starting a transfer using DMA.
e0013	Invalid DMA counter after data out.	The DMA transfer counter was higher after the transfer than before.
e0014	Invalid ASC command	The SCSI controller generated an “invalid command” status.
e0015	Unexpected ASC IRQ result	Unexpected status codes after a SCSI controller interrupt.
e0016	Waiting for IRQ after data in DMA	The SCSI controller did not respond after starting a transfer using DMA.
e0017	Invalid DMA count after data in	The DMA transfer count was higher after the transfer than before.

Table 4-1. VR320 Error Codes – (Continued)

ERROR CODES	MESSAGE	DESCRIPTION
e0018	Waiting for IRQ after "command complete"	A "command complete" message was received from the drive but the SCSI controller did not generate a final command completion response.
e0019	Waiting for IRQ after responding to Message-In	The SCSI command controller did not respond to a command to read a message byte from the drive.
e0020	Waiting for reselect	The drive disconnected during a SCSI command and did not reselect.
e0021	Waiting for IRQ after "accept message"	The SCSI controller did not respond to a command to accept a message from the drive.
e0022	Unexpected results after SCSI command	A SCSI command was not completed successfully.
e0023	Record stopped with medium error, etc.	The drive was in record mode and then was stopped, at which time there was a medium error or other fault condition reported by the drive.
e0024	Memory error detected	A memory error was detected while recording.
e0025	Memory allocation error	Memory allocation data was corrupted. System was restarted.
e0026	Memory initialization error	Memory could not be initialized and verified. System was restarted.
e0027	Exception caused restart or jump to monitor	
e0028	No status byte	This code (as well as codes e0029, e0030, and e0031) indicates a SCSI transaction error which has been observed in units with power supply cable problems.
e0029	No message byte after status byte	See e0028
e0030	Unexpected disconnect after data out phase	See e0028
e0031	Unexpected disconnect after data in phase	See e0028

Table 4-1. VR320 Error Codes – (Continued)

ERROR CODES	MESSAGE	DESCRIPTION
e0032	UNIT ATTENTION detected	This indicates an unintentional SCSI device reset. This has been observed in units with power supply cable problems.
e0033	Unexpected end of queue (zero link)	This indicates a memory allocation problem.

4-3. DRIVE REPORTED ERRORS.

Medium Error – The drive is telling the CPU that it has detected a flaw with the DDS media currently in the drive. This may have been caused by dirt accumulation on the head while the drive was in the record mode which prevented the CPU from writing to the media.

Position Error – This is the worst type of medium error than can occur. The drive is telling the CPU that it encountered problems trying to move the media during a read/write process.

Hardware Error – This drive reported error has a display followed by the designation for the drive that is in trouble along with an error code (i.e., Upper : Hardware Error 1501). These codes are drive manufacturer codes for which Eventide may or may not be able to translate. Normally when the drive is in trouble, either the DDS or hard disk must be replaced.

4-4. WANGDAT 3400 DX ERROR CODES.

Table 4-2 contains types of WangDat drive errors and lists the Additional Sense Code (ASC), the Additional Sense Code Qualifier (ASCQ), and their description.

Table 4-2. WangDat Error Codes

ASC	ASCQ	DESCRIPTION
00	00	No additional sense information
00	01	Filemark detected
00	02	End-of-Partition/Medium detected
00	03	Setmark detected
00	04	Beginning-of-Partition/Medium detected
00	05	End-of-Data detected
04	01	LUN is in process of Becoming Ready
04	02	LUN Not Ready, Initializing Command Required
0C	00	Write Error
11	00	Unrecovered Read Error
14	00	Recorded Entity Not Found
15	01	Mechanical Positioning Error

Table 4-2. WangDat Error Codes – (Continued)

ASC	ASCQ	DESCRIPTION
00	00	No additional sense information
00	01	Filemark detected
00	02	End-of-Partition/Medium detected
00	03	Setmark detected
00	04	Beginning-of-Partition/Medium detected
00	05	End-of-Data detected
04	01	LUN is in process of Becoming Ready
04	02	LUN Not Ready, Initializing Command Required
0C	00	Write Error
11	00	Unrecovered Read Error
14	00	Recorded Entity Not Found
15	01	Mechanical Positioning Error
20	00	Invalid Command Operation Code
24	00	Invalid Field in CDB
25	00	Logical Unit Not Supported
26	00	Invalid Field in Parameter List
27	00	Write Protected
28	00	Not Ready to Ready Transition
29	00	Power On, Reset, or Bus Device Reset Occurred
2A	00	Parameters Changed
30	00	Incompatible Medium Installed
30	01	Cannot Read Medium – Unknown Format
30	02	Cannot Read Medium – Incompatible Format
31	00	Medium Format Corrupted
3A	00	Medium Not Present
3B	0B	Position Past End of Medium
3D	00	Invalid Bits in Identify Message
40	00	RAM Failure
47	00	SCSI Parity Error
48	00	Initiator Detected Error Message Received
4E	00	Overlapped Commands Attempted
50	00	Write Append Error
50	00	Write Append Position Error

CHAPTER 5
MAINTENANCE

The VR320 is a complex unit incorporating precision mechanical assemblies, high speed electronic circuitry, and many years of software development and refinement. It has been conservatively designed to operate continuously for long periods of time in a highly reliable manner with a minimum of preventive maintenance. Like most electronic equipment used in continuous operation, it's two enemies are heat and dirt. Generally speaking if you keep it cool and clean it will provide you with many years of reliable operation.

Section I. PREVENTIVE AND CORRECTIVE MAINTENANCE

5-1. PREVENTIVE MAINTENANCE.

As the word implies *preventive* maintenance is performed on a routine or scheduled basis in hopes of preventing the need for corrective maintenance due to assembly failure. Cleaning the DAT tape drives with a cleaning tape like the Sony DG-5CL supplied with the unit is not only necessary, it is mandatory. Generally the drive should be cleaned after each full tape is removed from the unit. Keeping the unit cool is largely a matter of using common sense in picking a good location during the installation of the unit. The following items are the preventive maintenance tasks with recommended schedules.

5-1.1 DAT Drive Cleaning.

Recording and playback are critically dependent upon the cleanliness of the drive mechanism. Even microscopic particles of magnetic material (shed from the media) or environmental pollutants such as cigarette smoke can adversely affect the performance of the drive mechanism. The Clean LED next to the drive will light to indicate that the pre-set time between cleaning has elapsed. This is for reference only. For best results, follow the guidelines listed below rather than waiting for this light to alert you the drive must be cleaned. Clean the drive immediately if this light goes on.

Time: For every two weeks of operation, regardless of other circumstances, the drives should be cleaned.

Media: After every pass of a complete tape over the heads, clean the drives.

New & old media: Brand new media and media that have exceeded their useful life of approximately 10 passes are more likely to shed particles than other. If you are using exclusively new media, clean the drives after every pass. If you are using tapes beyond their useful lives, clean more often or replace your media.

Environment: If your VR320 is in an unusually dusty or smoky environment, cut the time between cleaning in half.

a. Clean the drive by inserting a DDS cleaning tape, such as the one supplied with the VR320. Wait for it to pop out. That's it. (The drive recognizes the cleaning tape and will automatically eject it. Do NOT use an Audio cleaning tape, which may not be recognized by the drive.)

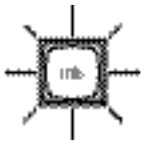
NOTE

It is very important to reset the clean timer. Otherwise the VR320 will not know that the drive was cleaned and the **Clean** LED will come on sooner than the 100 hours of drive operation (because the clean drive timer was not reset to 0:00).

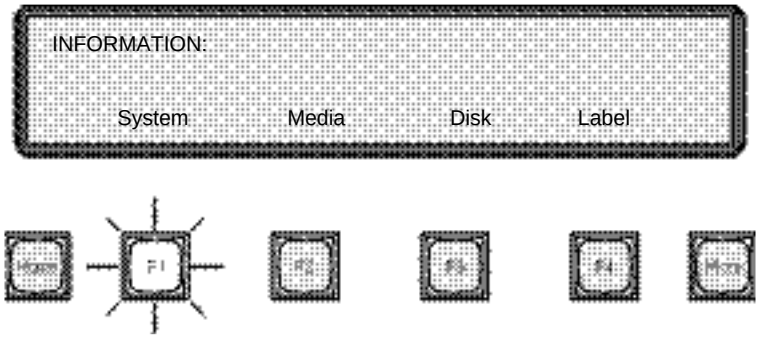
b. Reset the clean drive timer as follows:

From the **Home** screen:

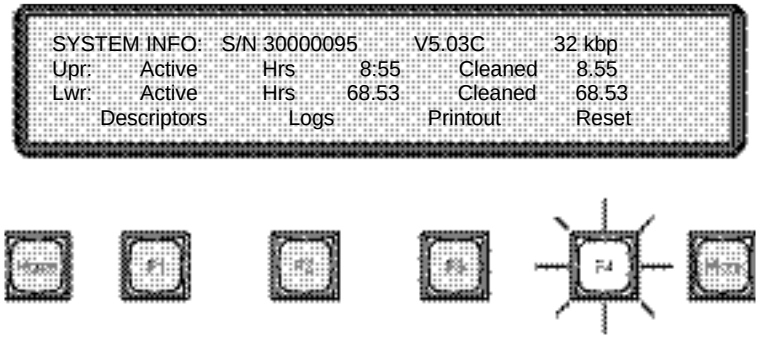
(1) Press the **Info** function key.



(2) Press F1 (the **System** soft key).



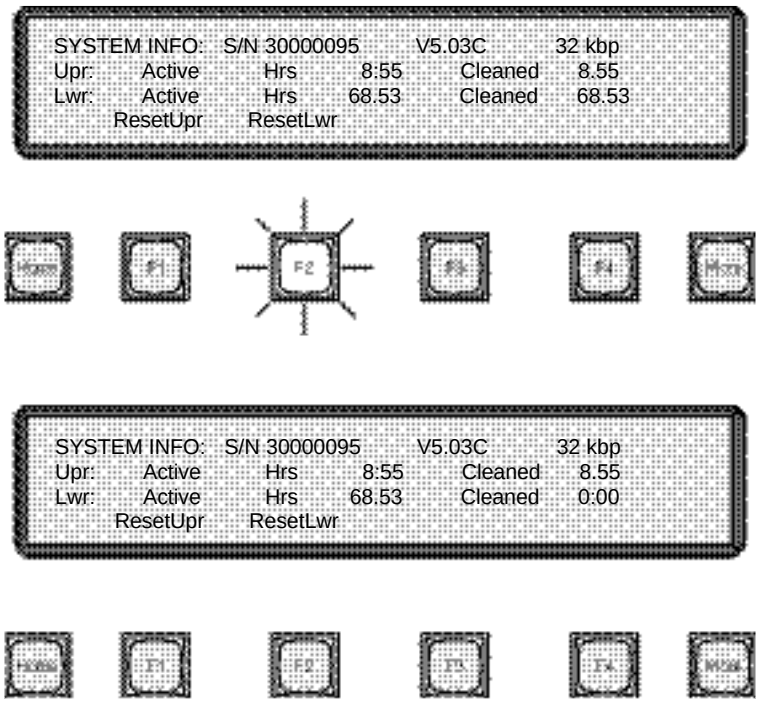
(3) Press F4 (the **Reset** soft key).



(4) Select the drive (upper or lower) that was cleaned by pressing:

F1 **ResetUpr** (Reset Upper) drive cleaning schedule time for 0:00

F2 **ResetLwr** (Reset Lower) drive cleaning schedule timer to 0:00



5-1.2 <u>Monthly or Bi-Monthly Checks</u>. Remove the fan filter and either vacuum or wash it to rid it of dust or other foreign matter that will prevent cool air from being pulled into the unit. If you elect to wash the filter, dry it completely before replacing it (to prevent water from being pulled into the unit). If the unit is installed in a very dusty environment this process may need to be performed weekly.

5-1.3 <u>Annual (Once A Year) Checks.</u>

a. Remove the top cover (para. 5-6) from the unit and vacuum out any dust or other debris that may have penetrated the fan filter.

b. With the cover removed, inspect the UPS battery for any signs of leakage or corrosion. Replace battery bracket assembly if necessary (para. 5-12).

c. Check that the battery connectors are firmly attached to the UPS/Battery Sensor Printed Circuit Board (PCB).

d. Test and observe the UPS option by removing the AC line cord while the unit is in the record mode to ensure the unit performs an orderly shutdown. With AC power removed, the unit should remain operational for 30 to 45 seconds and the message “Powering Down The Unit” should appear on the front panel display shortly before the unit stops operating.

e. Replace top cover (para. 5-6).

5-2. CORRECTIVE MAINTENANCE.

The VR320 has been designed to be field-serviceable at the module level. With few exceptions, component-level repair is neither practical nor supported. Note that the warranty permits you to work on the unit, but does not protect you from the consequences of improper repair. So, we suggest you adhere to the following guidelines if you experience difficulty.

The problems to which the VR320 is susceptible are more or less predictable. While anything can go wrong, some things are more likely to than others. Here are some things to suspect, and what you can do about them. The next section (Section II, TROUBLESHOOTING) lists other common malfunctions.

ARCHIVE DRIVES Mechanical items, such as the archive drive mechanism, degrade with continued usage. Absent a catastrophic failure, this is likely to result in an increasing error rate which will eventually result in tapes not giving their full capacity or in a loss of data. Before suspecting a defective drive, use the cleaning tape and see if there is an improvement.

In a dual-drive unit, see if the same media gives better performance in the other drive. In a single drive unit, try new media. If one drive works and the other does not, try swapping the cables between the upper and lower drives. If the non-working drive changes, you have either a bad cable or connector.

UPS BATTERY Read Appendix C explaining UPS operation. The battery is a limited-life item and should be replaced periodically.

Measure the battery voltage during UPS operation. If it was fully charged and it drops below 1.7 volts per cell by the time the UPS shuts down, it should be replaced.

CLOCK BATTERY If the clock loses its setting when AC power is shut off, the lithium battery on the CPU circuit board should be replaced. (This battery is only called upon to supply a few microamps, and then only when power is removed. You should not necessarily replace it even if measurements under load indicate that it is not up to its full capacity. Refer to paragraph 5-18.)

AUDIO INPUTS Because there is a direct connection to the outside world, it is possible that a channel can be knocked out by a lightning hit or other surge. Each audio board has eight or sixteen input sections and much shared digital circuitry. If all channels go out at once, it is very likely a digital problem calling for factory repair or replacement of the input board. If only one channel goes out, it is very likely an audio problem that can be repaired on site, if desired.

The 8- and 16-channel input/output modules must be installed in numerical order for them to be recognized by the CPU board. In a 32-channel VR320, if the board representing channels 1 through 16 is removed or is digitally defective, channels 17 through 32 will not work. If one board is removed for service, you can operate the recorder in a degraded mode by reconfiguring another board to take its place. The channel numbers that a board represents are determined by dip switches near and in a line perpendicular to the connector fingers (see Figure 5-2). To reconfigure a board, set the jumpers appropriately as shown on the board.

AUDIO OUTPUTS The three audio outputs (speaker, line, and headphone) all come from the same bus but with different level controls. If only one is defective, it may simply be a bad connection or output driver stage. The problem may be located by following the wire going to the jack. If the outputs are all dead, it is likely a digital problem that will require factory service or board replacement.

POWER SUPPLY There is typically more stress on a power supply than on the hardware to which it is supplying power. The modular power supply in the VR320 is called upon to supply +5, +12, and –12 volts. If, during operation, any of these voltages is significantly different, the power supply should be replaced (para. 5-13). *We recommend that you not attempt to service the power supply module.*

INTERMITTENTS If the unit begins to experience intermittent failures that seem to be unrelated to the causes above, one thing to try is to remove the electronic boards and clean the edge and cable connectors. This is especially likely to be effective if your environment is more dusty than usual, or you have atmospheric corrosion problems such as those common to seaside areas.

SELFTEST Each time the VR320 is turned on, it goes through a selftest that confirms that the digital circuitry is operating correctly. It also tests the tape drive interface (but not the drives themselves).

If there is a self-test failure, a message will appear on the display and the unit will not operate. If the message relates to the clock ("RTC") failure, it may be that the clock battery has discharged and there is nothing actually wrong. In this case, simply follow the instructions on the display. (Replace the battery as soon as convenient.)

If the unit fails other parts of the turn-on selftest and the problem does not abate the next time you turn the VR320 on, the problem is most likely in the logic circuitry. There will be a cryptic message on the display and the **System Fault LED** will come on. Be sure to write down the *exact wording* of the selftest failure message(s) and call Eventide technical support for advice.

Because of the substantial weight and size of the VR320, and the fact that it is frequently possible to diagnose a problem to the board or module level, we recommend that you do not routinely return the entire unit to Eventide for service. In particular, the individual media drives are field-replaceable, as are the audio boards, the CPU board and the power supply. Other boards may be exchanged with a bit more effort. Figure 5-1 shows the top view of the VR320 major assemblies.

Please call Eventide before returning the unit for service.

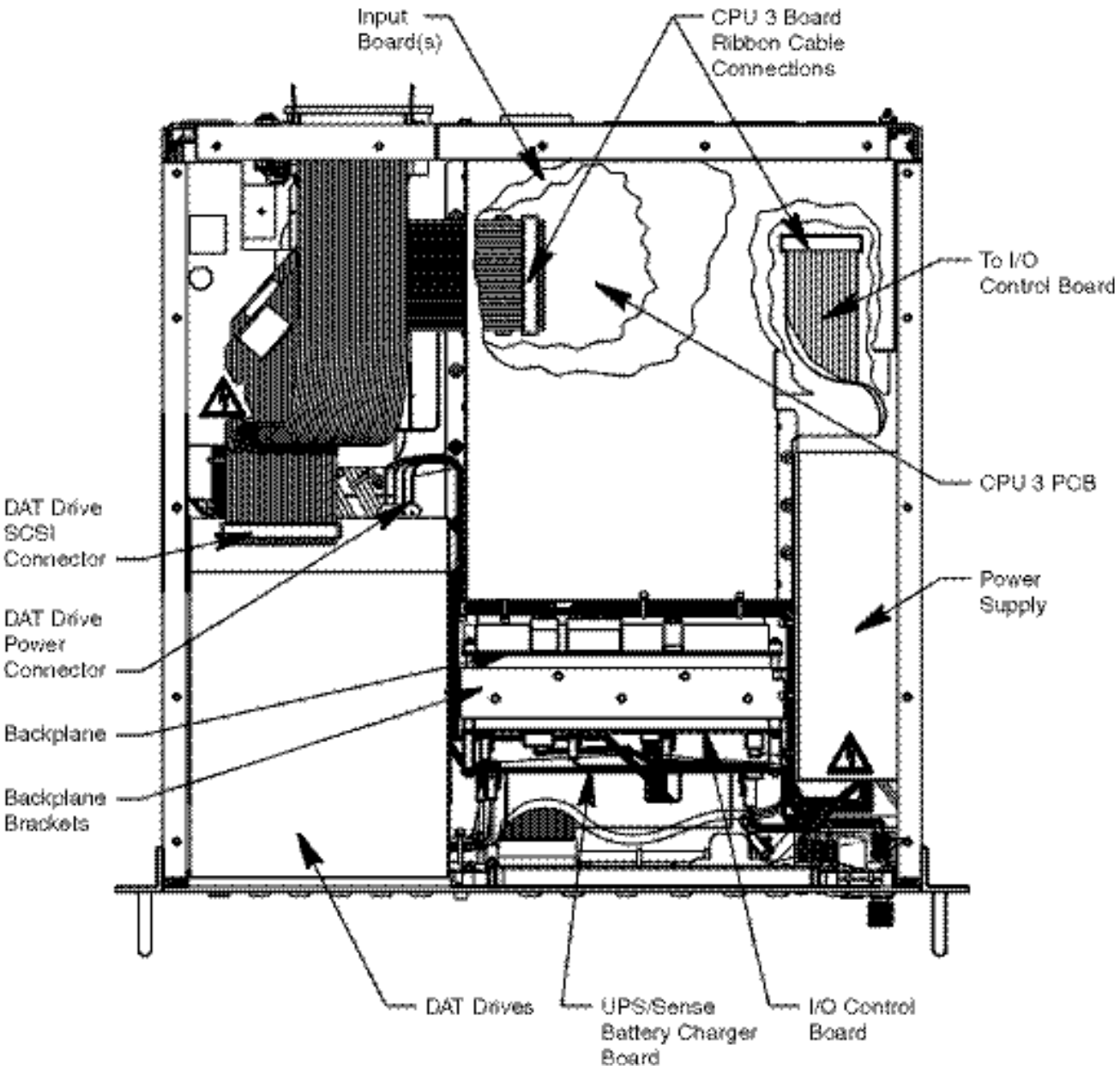


Figure 5-1. Top View of VR320 Major Assemblies

Section II. TROUBLESHOOTING

5-3. EQUIPMENT INSPECTIONS.

Use the following inspection procedures to locate obvious malfunctions within the VR320.

a. Inspect all external surfaces of VR320 for physical damage, breakage, loose or dirty contacts, and missing components.

WARNING

Hazardous voltages are present when covers are removed. Where maintenance can be performed without having power applied, power should be removed.

CAUTION

Many components within the VR320 are extremely susceptible to static-discharge damage. Service the VR320 only in a static-free environment. Always observe standard handling precautions for static-sensitive devices.

b. Remove covers as required to gain access to components.

c. Inspect PCB surfaces for discoloration, cracks, breaks, and warping.

d. Inspect PCB conductors for breaks, cracks, cuts, erosion, or looseness.

e. Inspect all assemblies for burnt or loose components.

f. Inspect all chassis-mounted components for looseness, breakage, and loose contacts or conductors.

g. Inspect equipment for disconnected, broken, cut, loose, or frayed cables or wires.

5-4. TROUBLESHOOTING PROCEDURES.

Table 5-1 lists common malfunctions which may be found during normal operation or maintenance of the VR320. Direct factory technical support is available via telephone during normal business hours 9 a.m. to 5 p.m. Monday through Friday E.S.T. by calling (201) 641-1200.

Table 5-1. Troubleshooting

MALFUNCTION	CHECKS	CORRECTIVE ACTION
Unit not operating.	• Check power supply connection. • Check power supply breaker. • Check for blown fuse. • Check for correct power input setting and fuse size to conform to local supply. • Check if unit is overheated.	Connect power cord. Ensure breaker is in ON position. Replace fuse. **NOTE** The fuse holder snaps out from the bottom of power cord connection on the left rear panel assembly. Ensure correct setting and fuse rating (para. 2-7). Refer to Unit Overheating (Table 5-1).
Unit overheating.	• Check for dirty fan intake filter. • Check ambient temperature and environment conditions of units' location. • Check unit for dirty interior.	Remove holder and clean filter. Ensure unit operates in clean smoke-free cool environment. Remove top cover and vacuum interior of unit (para. 5.1-3).
Two flashing amber lights on WangDat drive. Far right-hand light flashing on Sony or TECMAR tape drives when no media is in drive. Front panel red fault light comes on.	• Indicates that drive is dirty. • Check if cleaning tape is at end of tape.	Clean DAT tape drive with cleaning tape (para. 5.1-1). **NOTE** DAT tape drives should be cleaned every complete pass of a tape over the heads. Tape drives cannot be damaged by cleaning too often. Replace cleaning tape when at end of tape (after about 25 uses).

Table 5-1. Troubleshooting – (Continued)

MALFUNCTION	CHECKS	CORRECTIVE ACTION
Drive Status Clean LED light comes on.	• Indicates that drive is dirty.	Clean DAT tape drive with cleaning tape (para. 5.1-1).
	• Check if cleaning tape is at end of tape.	Replace cleaning tape when at end of tape (after about 25 uses).
	• Check if the clean timer was reset after last cleaning.	Clean DAT drive and reset clean drive timer (para. 5.1-1).
Drive Status LED light comes on.	Conditions exist that prevent logger (media or hard drive) from recording.	Check for overheating drive and logger cleanliness.
Red LED light on WangDat drive is on.	Faulty drive.	Replace drive (para. 5-8).
Drive will not record.	Check if drive will format new media.	Replace drive if new media is not formatted.
	If other drive is working, swap SCSI cables.	If faulty drive begins working, replace SCSI cable.
Playback is distorted on all channels.	Recommend motherboard be replaced.	Replace motherboard (para. 5-9).

Section III. REPLACEMENT PROCEDURES

5-5. INPUT BOARD(S).

NOTE

- Up to three input boards may be installed: top, middle, and bottom. Some VR320s are built with a top board installed; some are built with no board in the top position (the connector holes are covered with a plate).
- If a top input board is installed, the main rear panel must be removed before the top input board can be removed.
- The CPU board is located beneath the bottom input board. The main rear panel must be removed before the CPU board can be removed.
- The middle and bottom input boards can be removed without removing the main rear panel.

a. Remove (middle and bottom input boards only).

(1) Loosen thumb screws on middle input board. See illustration in paragraph 5-6.

(2) Gently pull on thumb screws to disengage middle input board from motherboard.

(3) Slide middle input board out from rear of unit.

(4) Repeat steps (1) thru (3) for bottom input board.

b. Install (middle and bottom input boards only).

(1) Check board dip switches configuration (Figure 5-2) for channels selected on replacement input board.

(2) Position bottom input board onto PCB cage assembly from rear of unit. Slide input board into PCB cage assembly until engaged with motherboard.

(3) Tighten thumb screws to secure input board to rear panel.

(4) Repeat steps (1) thru (3) for middle input board.

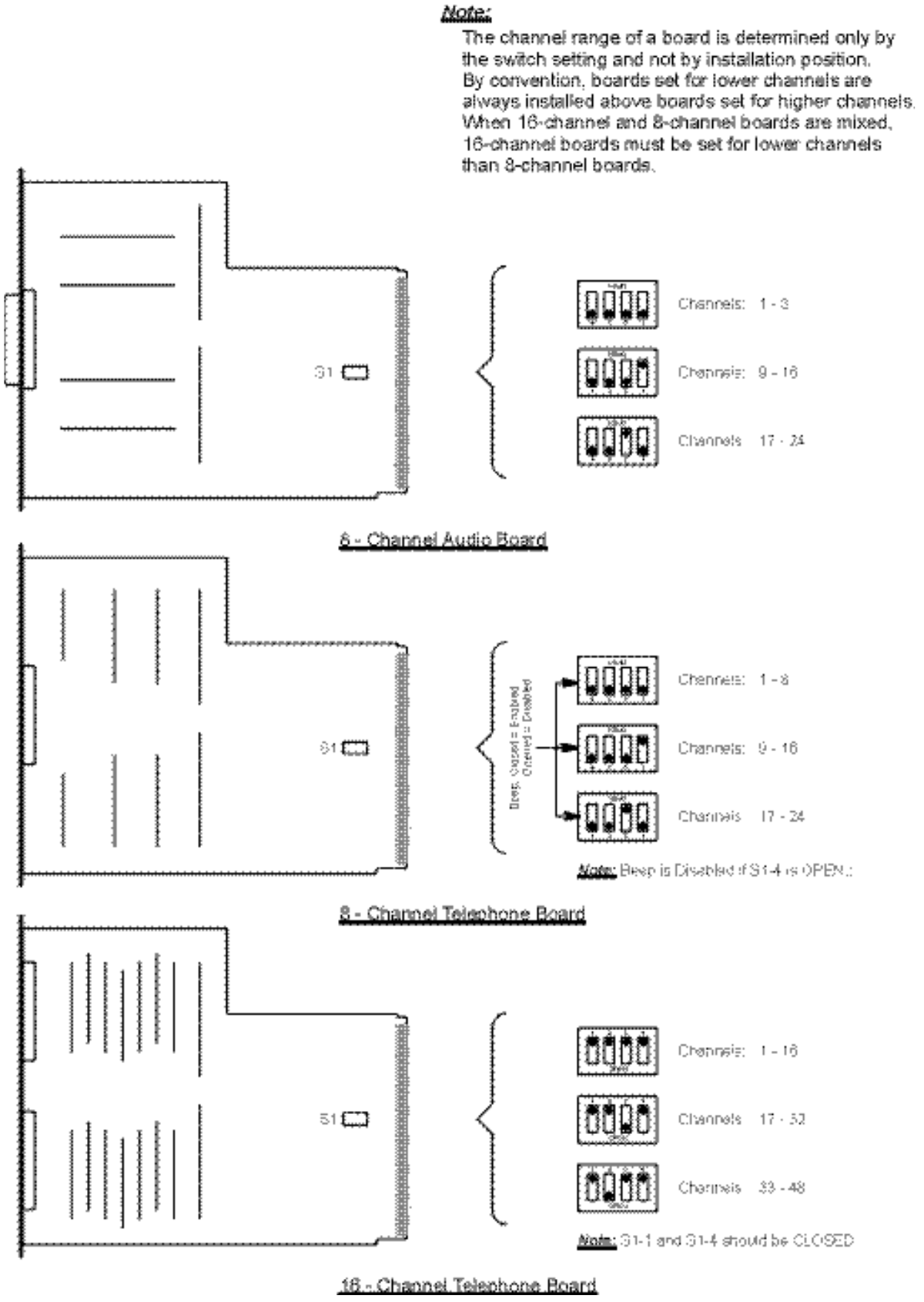


Figure 5-2. Input Board Configuration Settings

5-6. TOP COVER AND REAR PANEL.

a. Remove.

(1) Disconnect AC line cord. Wait for a complete shutdown of the unit before proceeding.

(2) Remove top cover (Figure 5-3) as follows:

(a) Remove fifteen #4 screws.

(b) Remove five #6 screws.

(c) Remove cover.

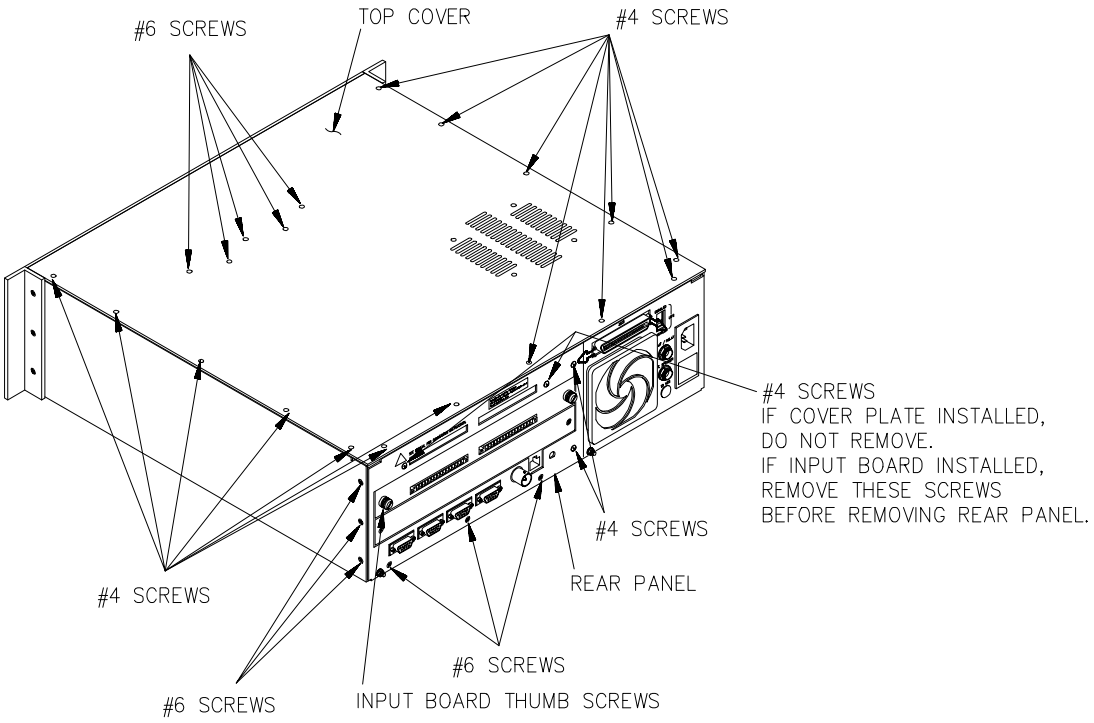


Figure 5-3. Top Cover and Rear Panel

(3) Remove rear panel as follows:

(a) Remove any input board with thumb screws.

(b) Remove three #6 screws from left side of VR320.

(c) Remove three #6 screws from bottom of rear panel.

(d) Remove two #4 screws from rear panel near fan.

(e) If you are removing only the rear panel and not the top cover, remove the three #4 screws from the top cover that holds the rear panel.

(f) If a top board is installed, remove the two #4 screws next to the input connectors.

(g) Remove the rear panel.

b. Install.

(1) Install rear panel as follows:

(a) If a board was removed from the top position, reinstall it.

(b) Install rear panel to chassis with three #6 screws at bottom of rear panel, three #6 screws on left side of VR320, and two #4 screws on right side of rear panel near the fan.

(c) If there is a top input board, replace two #4 screws next to connectors.

(d) Install any input boards with thumb screws.

(2) Install top cover onto unit and secure with five #6 screws and fifteen #4 screws.

5-7. CPU 3 PCB.

a. Remove.

(1) Remove middle and bottom input boards.

(2) Remove rear panel (para. 5-6).

(3) Remove top input board if installed.

(4) Disconnect three ribbon cables from CPU 3 PCB (Figure 5-4).

(5) Slide CPU 3 PCB out from back of unit.

b. Install.

(1) Slide CPU 3 PCB into PCB cage assembly until engaged with motherboard.

(2) Connect three ribbon cables to CPU 3 PCB.

(3) Install top input board (if any), rear panel, middle and bottom input boards.

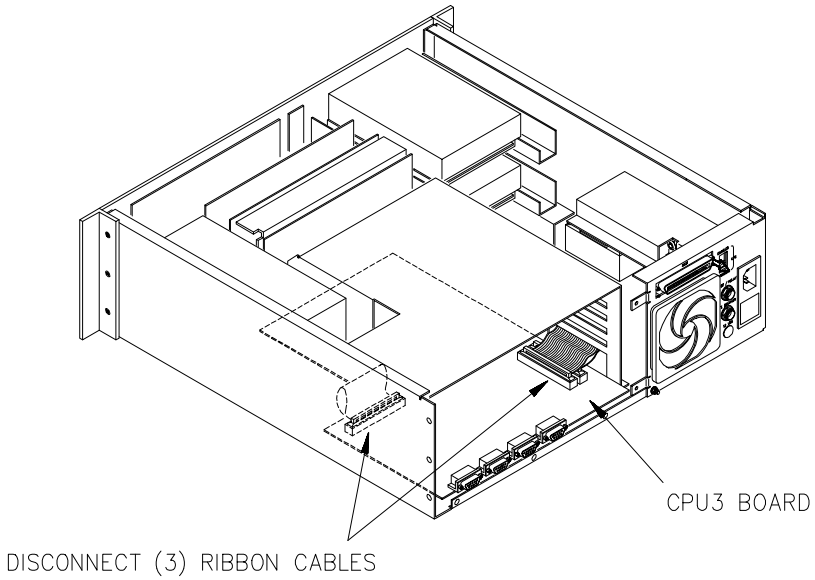


Figure 5-4. CPU 3 PCB

5-8. DDS DRIVE(S).

Should a DDS drive become defective, it cannot be repaired in the field and must be replaced as a complete assembly. Replacement drives are available from Eventide on an exchange basis. Please do not attempt to substitute the drive with a generic replacement as this can cause malfunction and may damage the operation of the VR320. The following procedure should be used if drive replacement becomes necessary.

a. Remove.

(1) Disconnect AC power cord to VR320.

(2) Remove top cover (para. 5-6).

(3) Carefully remove all power and SCSI connectors from all drives (see Figures 5-1 and 5-5).

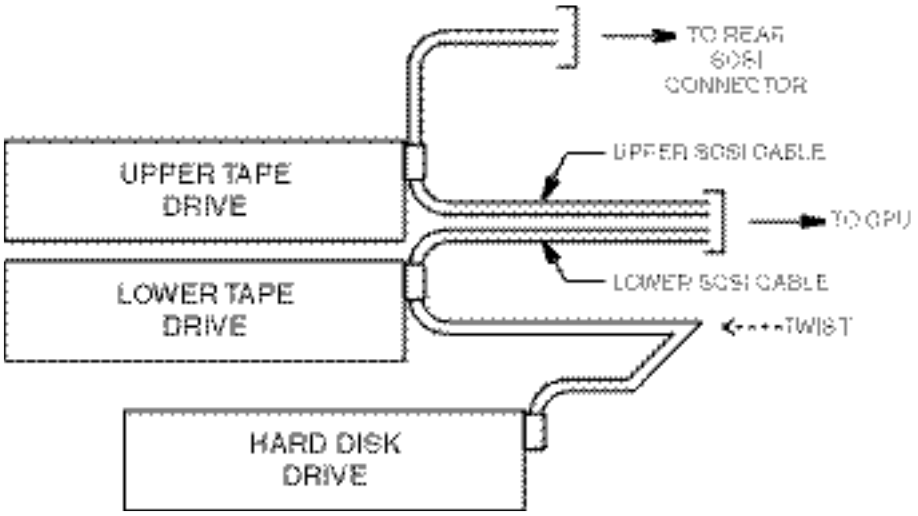


Figure 5-5. DDS Drive(s)

NOTE

The screws that hold the DDS drives to the mounting bracket assemblies are metric. The other screws are standard. Be careful to keep them separate as they look approximately the same.

(4) Turn the VR320 on its left side and remove the four screws used to hold the entire drive assembly to the bottom chassis (Figure 5-6). Be careful not to let the drives fall.

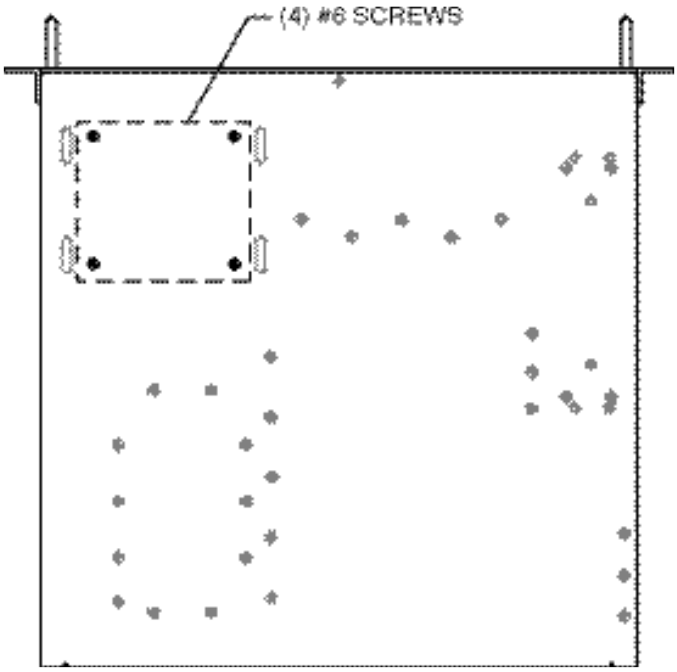


Figure 5-6. Drive Assembly Location on Bottom Chassis

(5) Carefully remove the entire drive assembly from the unit.

(6) Remove drives from assembly as follows:

(a) If you are removing the bottom drive, remove the four metric screws holding it to the chassis mounting bracket, and the four screws holding it to the upper drive/filler panel.

(b) If you are removing the upper drive (in a dual drive unit), remove the four metric screws holding it to the brackets attached to the bottom drive.

b. Install.

(1) Set the dip switches and option jumpers on the replacement drive to match the sketch shown in Figure 5-7 (Sheets 1 thru 7) depending on the type and location of the drive (upper or lower). The types of drive configurations used on the VR320 are:

Sony SDT-5200
TECMAR 3400 DX DDS-2 (see note)
TECMAR 3800 DDS-2
TECMAR 3900 DDS-3
AIWA GD-8000 DDS-2
Pinnacle Micro OHD-4600/Apex 4.6 GB
DVD-RAM (Creative or Panasonic)

NOTE

Some drives from TECMAR may be labeled "WangDAT" or "Rexon".

(2) Install the new drive in the space vacated by the defective drive. Line up the front bezels of the drives (or the blank filler panel). Reinstall the screws to secure the drive properly to the drive mounting bracket. The brackets have oval openings in them to allow for moving the entire assembly to achieve alignment with the front panel.

(3) Connect all power and SCSI connectors from all drives.

(4) Apply power and confirm that the unit is now operating properly before replacing the top cover. If there appears to be a problem, verify that the SCSI connectors are installed as per Figures 5-1 and 5-5 and are properly seated.

(5) Install top cover (para. 5-6).

IMPORTANT

DDS drive assemblies are not throw away items. If you purchased a "refurbished" drive from Eventide on an "out of warranty" exchange basis and fail to return the defective drive you will be charged an additional amount.

If you receive a "new" drive from Eventide as an "in warranty" exchange you MUST return the defective drive. If you do not you will be charged the full price of a new drive.

When returning the defective drive, please place the drive in the anti-static bag and reuse the same carton and packing material in which you received the replacement drive. DDS drives are delicate assemblies and if the drive incurs shipping damage on the return trip to Eventide you will be charged the same amount as though you had not returned the defective drive.

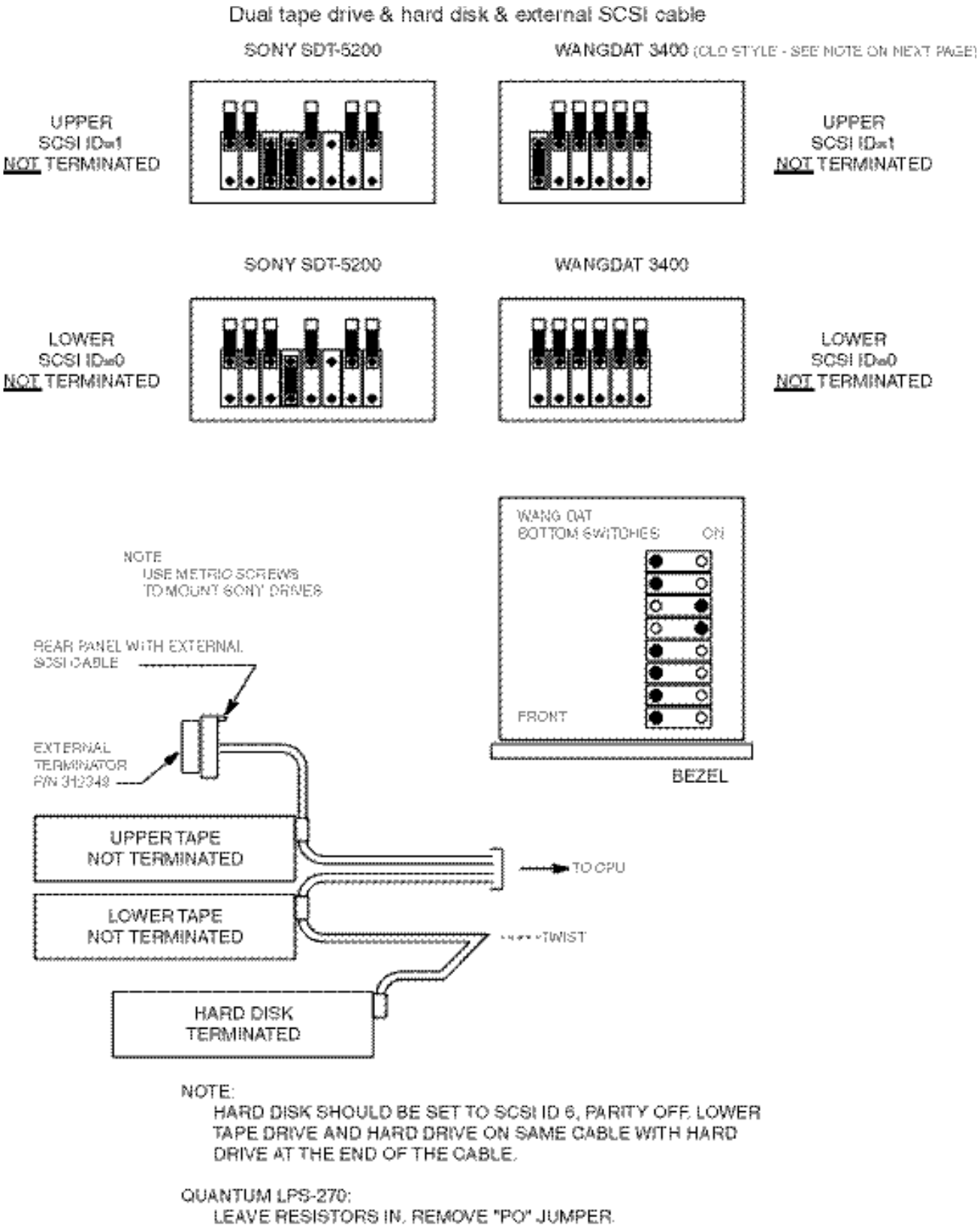


Figure 5-7. VR320 Drive Configurations (Sheet 1 of 7)

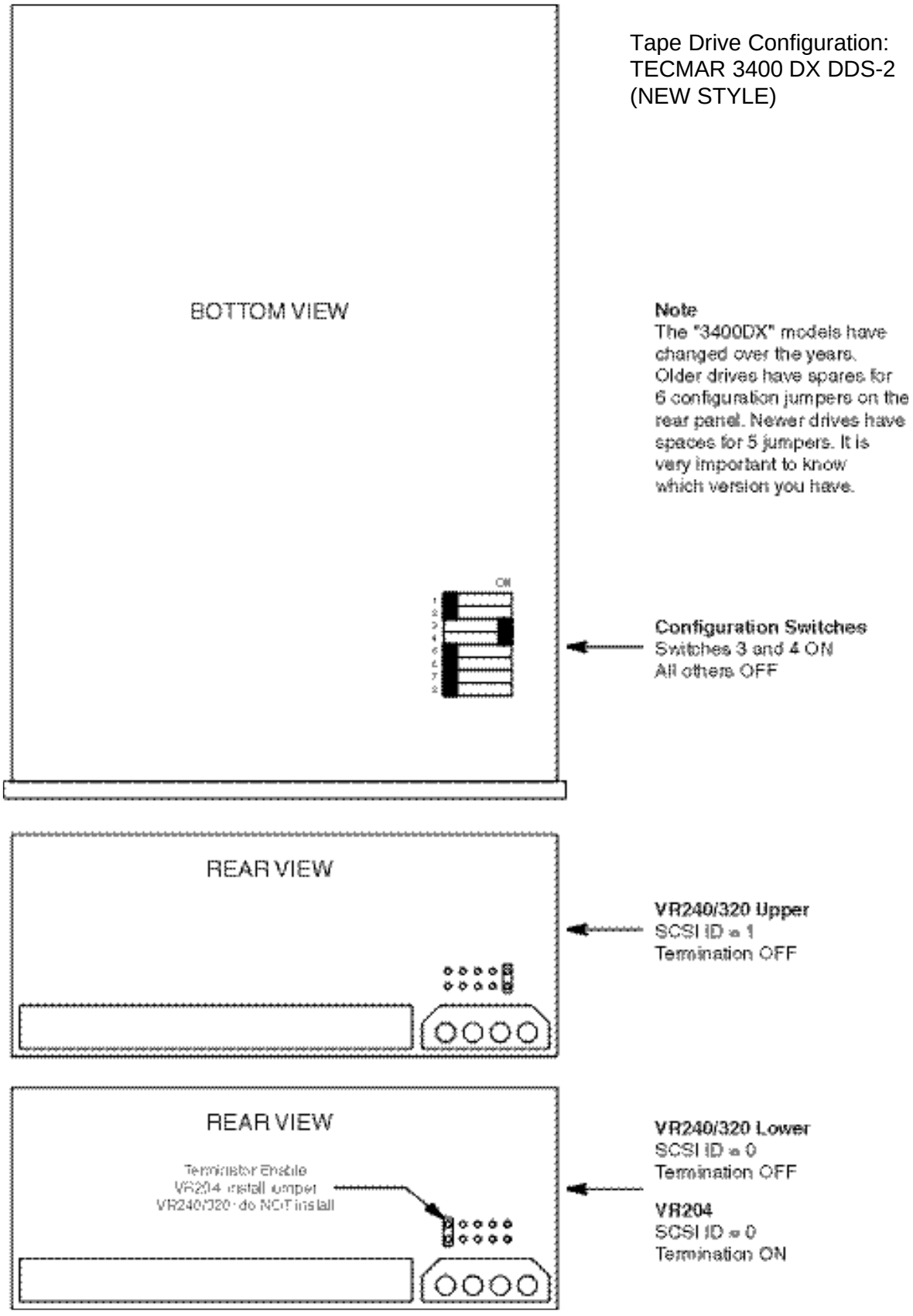


Figure 5-7. VR320 Drive Configurations (Sheet 2 of 7)

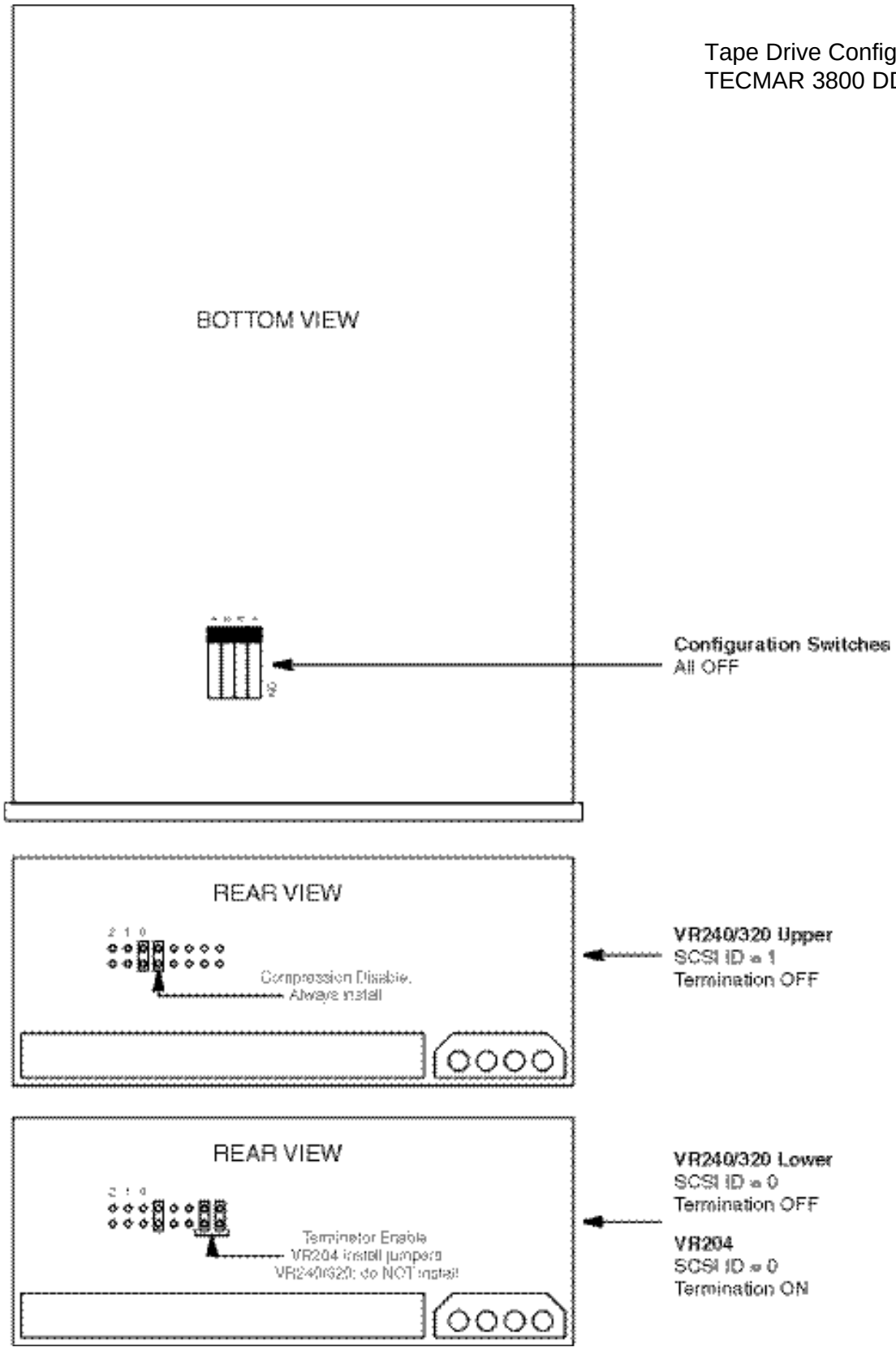


Figure 5-7. VR320 Drive Configurations (Sheet 3 of 7)

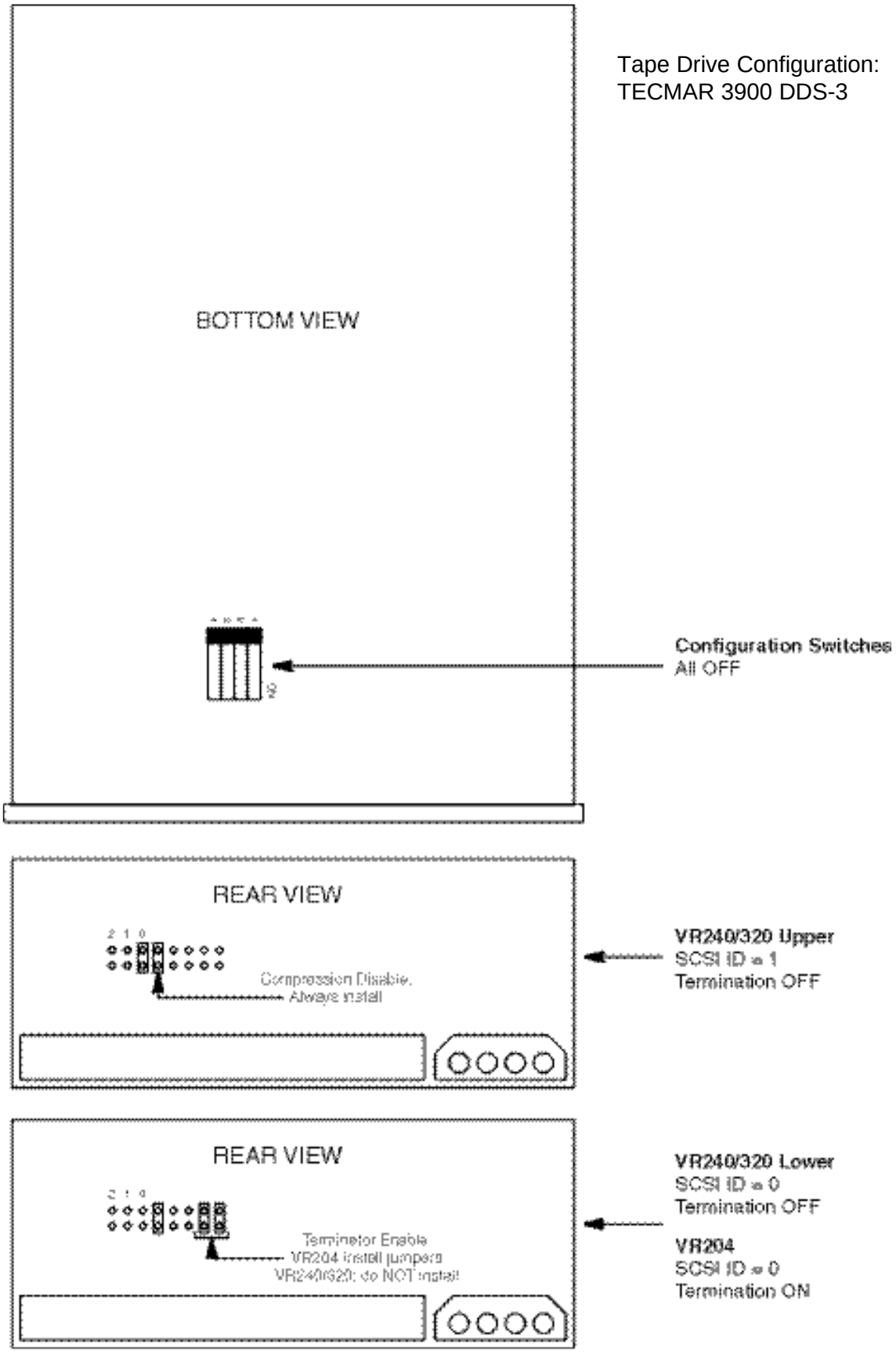


Figure 5-7. VR320 Drive Configurations (Sheet 4 of 7)

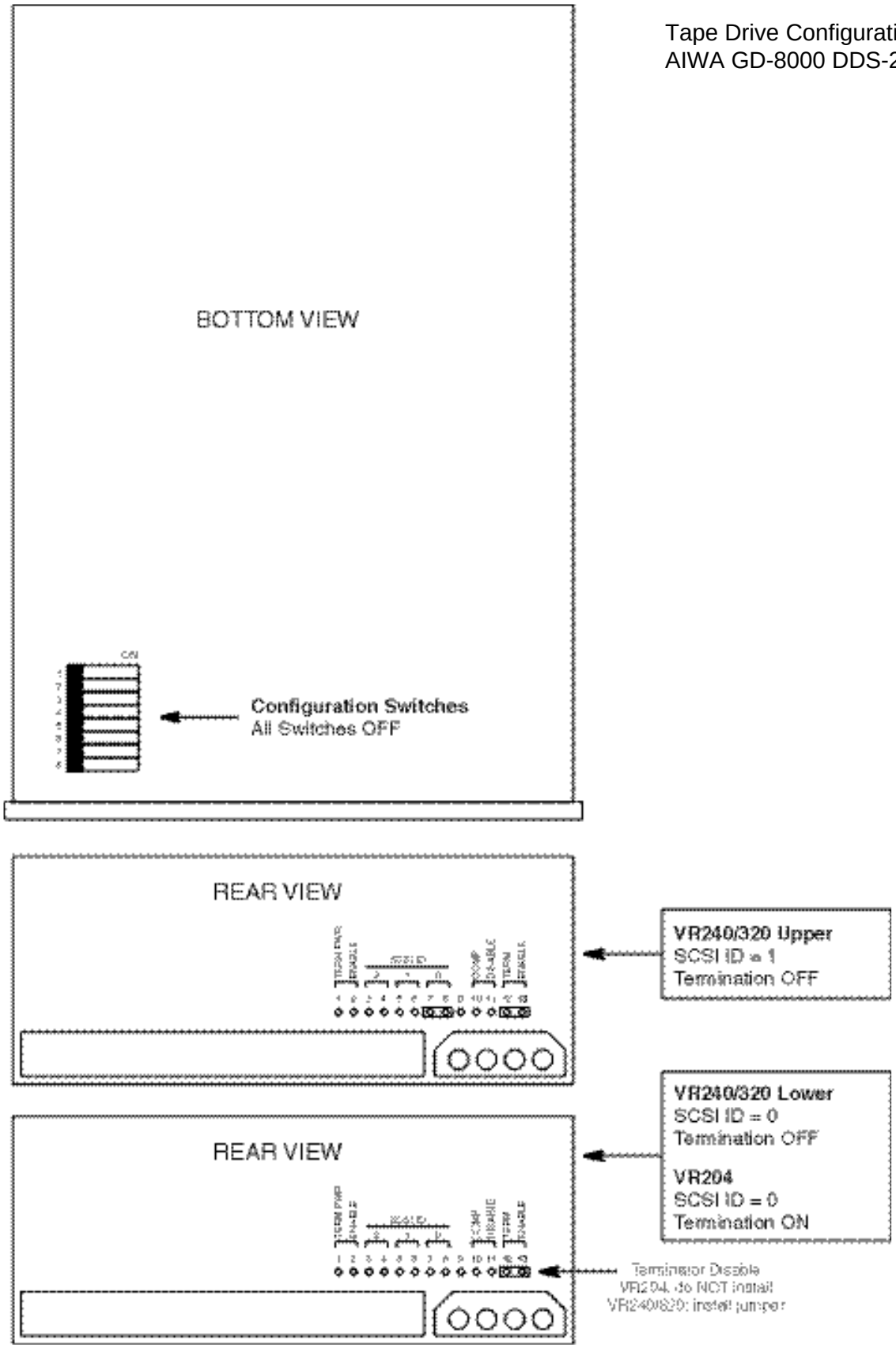


Figure 5-7. VR320 Drive Configurations (Sheet 5 of 7)

Drive Configuration:
Pinnacle Micro OHD-4600/Apex 4.6GB

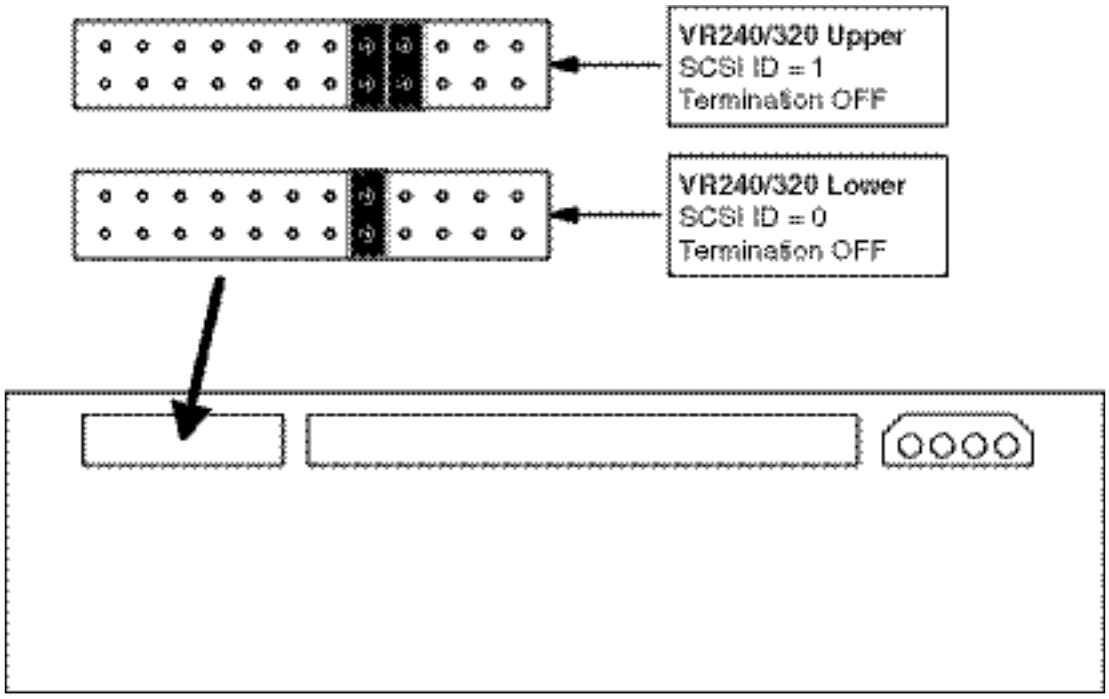


Figure 5-7. VR320 Drive Configurations (Sheet 6 of 7)

DVD-RAM Drive Configuration:
Creative or Panasonic

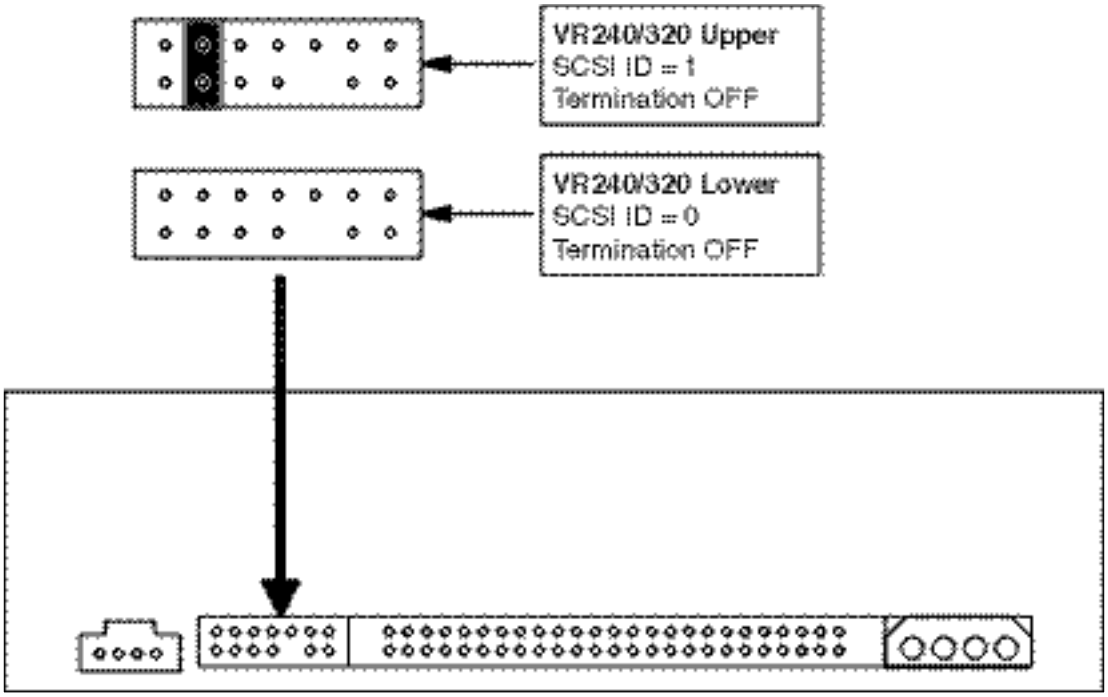


Figure 5-7. VR320 Drive Configurations (Sheet 7 of 7)

5-9. BACKPLANE WITH PCBs.

a. Remove.

(1) Remove backplane with PCBs.

(a) Remove top cover (para. 5-6).

(b) Remove middle and bottom input boards.

(c) Remove rear panel and top board.

(d) Tag and disconnect connectors to PCBs. Refer to connector lists (para. 5-19 thru 5-21).

(e) Remove CPU 3 PCB (para. 5-7).

(f) Turn unit on side and remove five #6 screws holding backplane bracket to chassis (Figure 5-8). Do not let PCBs drop while removing screws and lifting PCBs out of chassis.

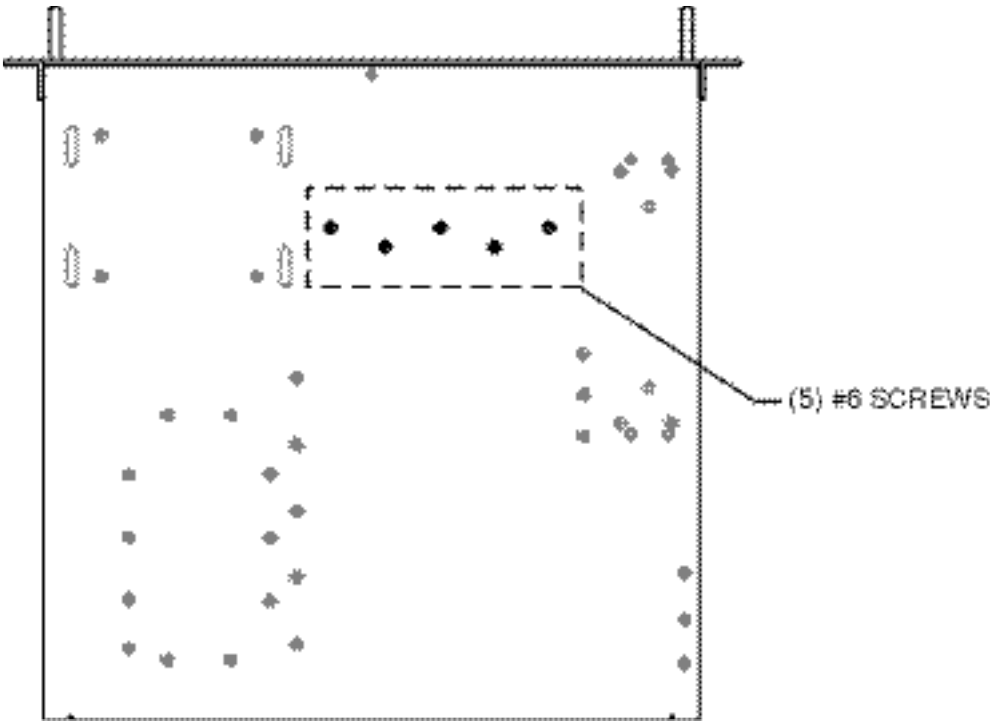


Figure 5-8. Backplane Bracket Location on Bottom Chassis

(2) Remove UPS PCB and Front Panel I/O PCB from backplane (Figure 5-9).

(a) Remove four screws with washers holding UPS/Sense Battery Charger PCB to standoffs. Remove UPS/Sense Battery Charger PCB.

(b) Remove four standoffs and I/O control PCB from standoffs.

(c) Remove four standoffs from backplane bracket.

(d) If required, remove motherboard from backplane bracket by removing twelve screws, washers, and standoffs.

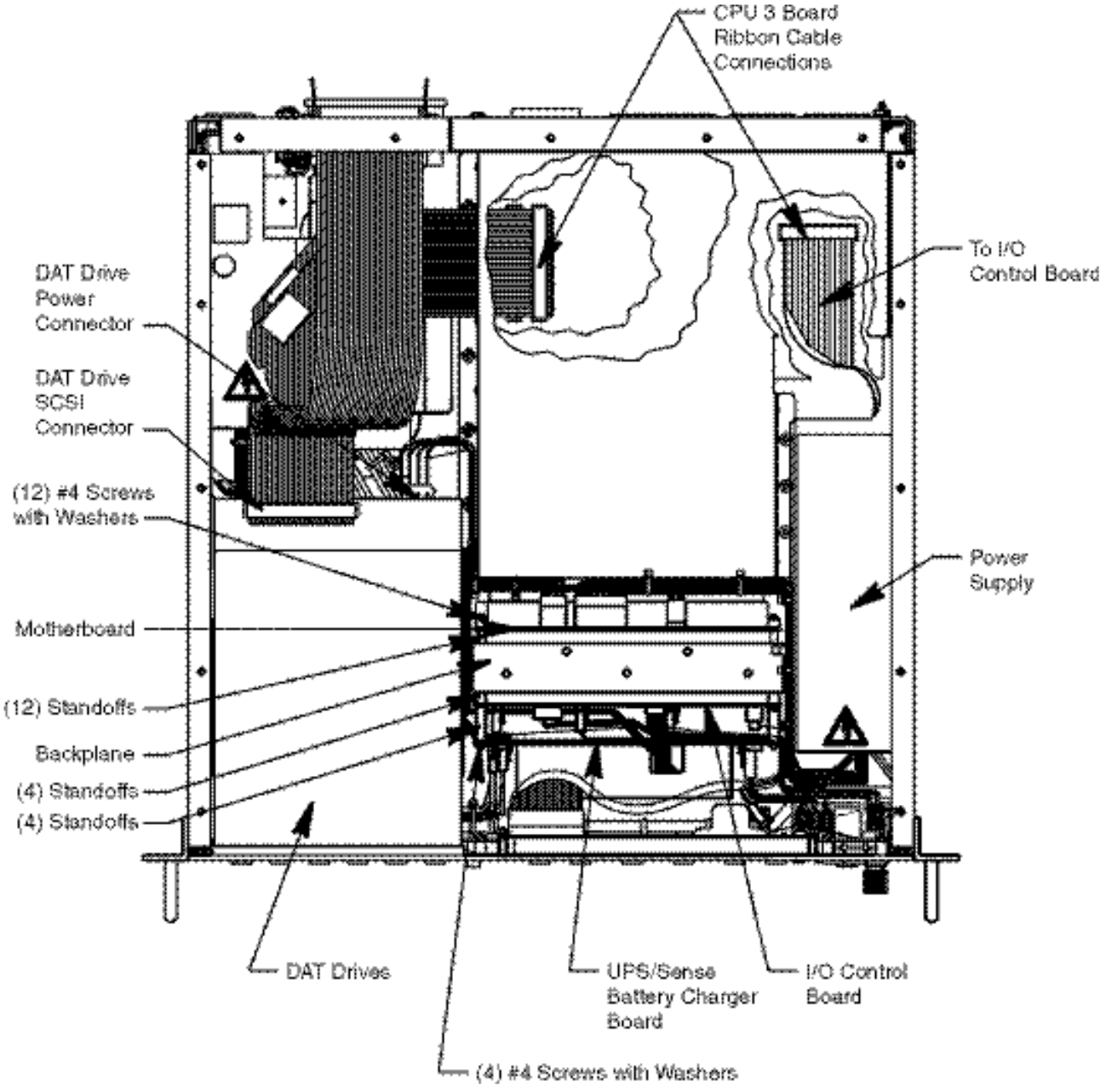


Figure 5-9. Backplane with PCBs

b. Install.

(1) Attach PCBs to backplanes as follows:

(a) If removed, attach motherboard to backplane bracket with twelve standoffs, washers, and screws.

(b) Install four standoffs to backplane bracket.

(c) Secure I/O control PCB to standoffs with four standoffs.

(d) Secure UPS/sense battery charger PCB to standoffs with four washers and screws.

(2) Install backplane with PCBs as follows:

(a) Place unit on its side.

(b) Install backplane with PCBs into unit and secure to bottom of chassis (Figure 5-8) with five #6 screws.

(c) Connect connectors to PCBs and remove tags. Refer to connector lists (para. 5-19 thru 5-21).

(d) Install rear panel (para. 5-6).

(e) Install input boards (para. 5-5).

(f) Install top cover (para. 5-6).

5-10. TRANSFORMER.

a. Remove.

(1) Remove top cover (para. 5-6).

(2) Remove transformer cover (Figure 5-10) by removing one #4 screw from the bottom of the unit and two #4 screws from the left side.

(3) Tag and disconnect connectors. Refer to connector list (para. 5-23).

(4) Remove two #8 screws with plastic nuts and transformer from left side of chassis.

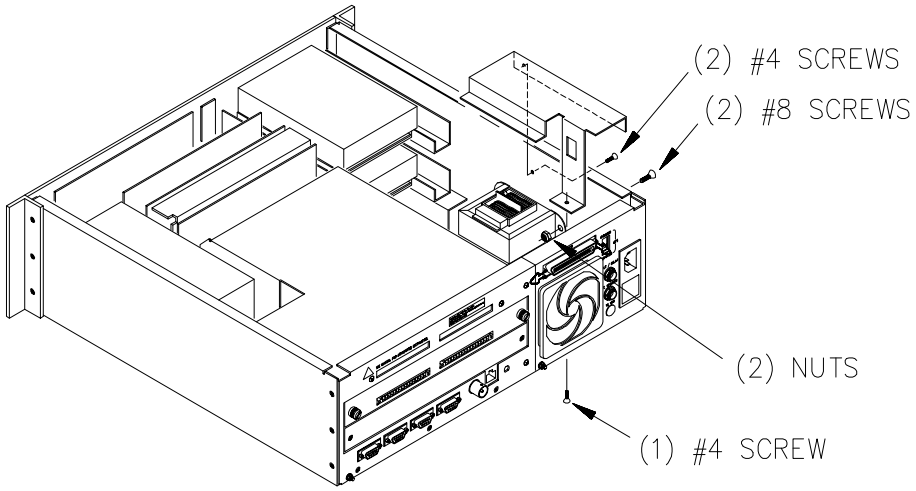


Figure 5-10. Transformer Cover and Transformer

b. Install.

(1) Insert transformer into unit and secure to the left side of chassis with two #8 screws and plastic nuts.

(2) Connect cable assemblies. Refer to connector list (para. 5-23).

(3) Install transformer cover and secure with one #4 screw on the bottom of the unit and two #4 screws from the left side.

5-11. FAN.

a. Remove.

(1) Remove top cover (para. 5-6).

(2) Remove transformer cover (para. 5-10).

(3) Remove air filter holder and filter from fan assembly (Figure 5-11). Refer to connector list (para. 5-25).

(4) Tag and disconnect P1 connector for fan assembly.

(5) Remove two short (5/8") and two long (1-3/4") #6 screws with washers and nuts holding fan assembly to right rear panel.

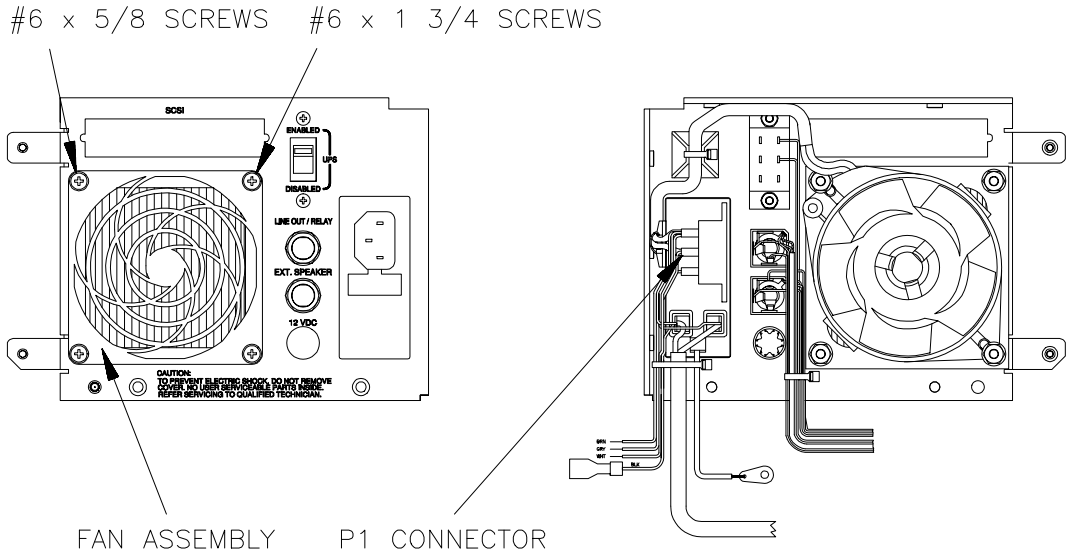


Figure 5-11. Fan Assembly

b. Install.

(1) Attach fan assembly to right rear panel with two short and two long #6 screws with washers and nuts.

(2) Connect P1 connector for fan assembly. Refer to connector list (para. 5-25).

(3) Install fan air filter holder with air filter.

(4) Install transformer cover (para. 5-10).

(5) Install top cover (para. 5-6).

5-12. BATTERY BRACKET ASSEMBLY.

a. Remove.

(1) Remove top cover (para. 5-6).

(2) Disconnect ribbon cables from drives (see Figure 5-1) and lift away from top of battery bracket assembly.

(3) Tag and disconnect battery bracket assembly wire cables (Figure 5-12) from UPS/Battery Sensor PCB. Refer to connector list (para. 5-19).

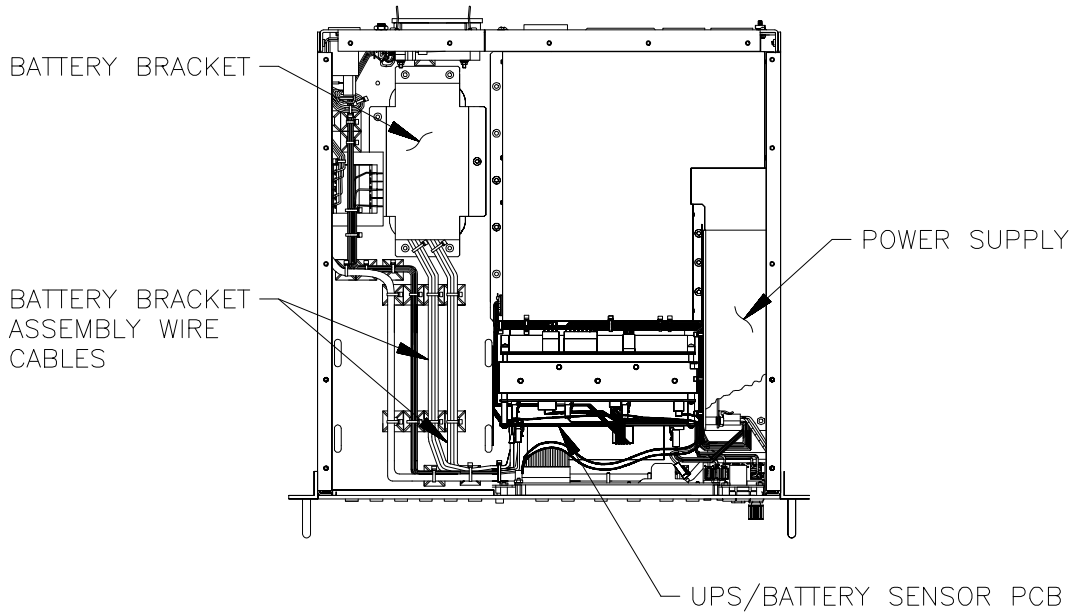


Figure 5-12. Battery Bracket

(4) Turn unit on right side and remove ten #6 screws from bottom of chassis (Figure 5-12). Do not let battery bracket assembly drop while removing screws and lifting battery bracket assembly out of chassis.

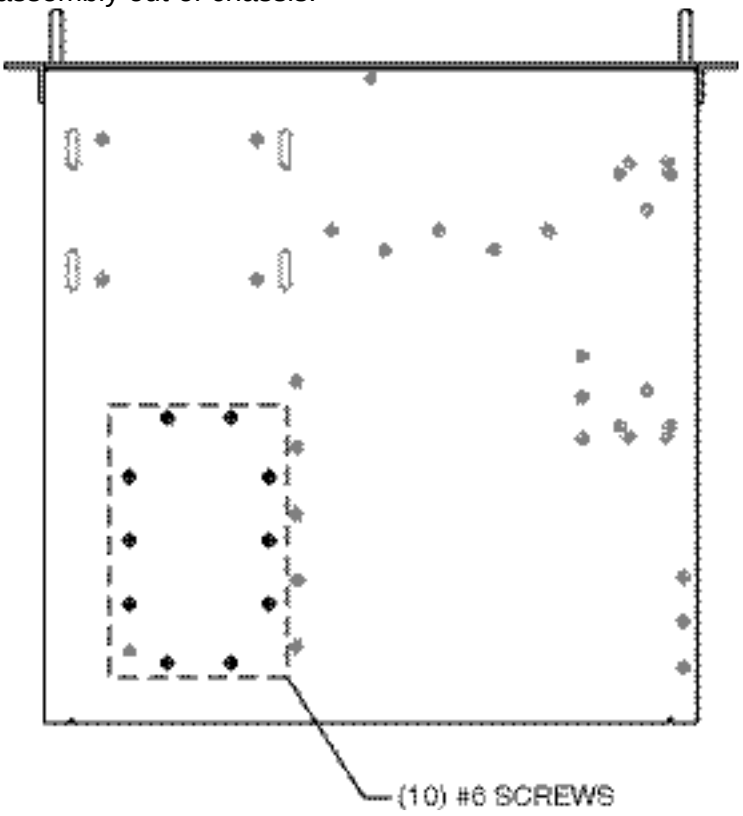


Figure 5-13. Battery Bracket Assembly Location on Bottom Chassis

b. Install.

(1) Insert battery bracket assembly into unit and secure to bottom of chassis with ten #6 screws.

(2) Connect battery bracket assembly cable assembly to UPS/battery sensor PCB. Refer to connection list (para. 5-19).

(3) Position ribbon cables over battery bracket assembly and connect to CPU 3 PCB and drives.

(4) Install top cover (para. 5-6).

5-13. POWER SUPPLY.

a. Remove.

(1) Remove top cover (para. 5-6).

(2) Disconnect two connectors to power supply (Figure 5-12). Refer to connector list (para. 5-24).

(3) Turn unit on left side and remove the #6 screws holding power supply to chassis (Figure 5-14). Do not let power supply drop while removing screws and lifting power supply out of chassis.

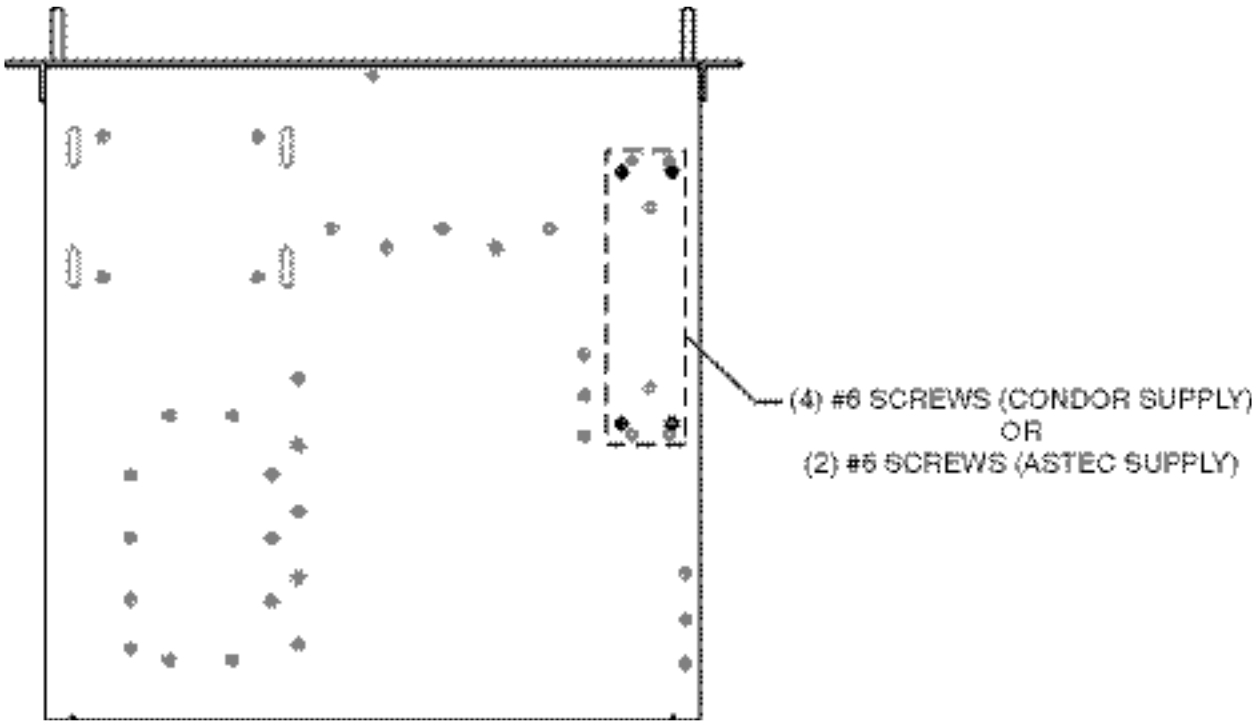


Figure 5-14. Power Supply Location on Bottom Chassis

b. Install.

(1) Insert power supply into unit and secure to bottom of chassis with #6 screws.

(2) Connect the two connectors (from motherboard and line filter) to power supply.

(3) Install top cover (para. 5-6).

Section IV. ADJUSTMENTS

5-14. ADJUSTMENT POTENTIOMETERS (pots).

The VR320 has four adjustment pots, two are located on the UPS Sense/Battery Charger PCB and two are located on the Front Panel I/O Control PCB. (See Figure 5-15). These adjustment potentiometers are normally set at the factory and never need to be readjusted. However, should one of these PCBs become defective and need to be replaced, you will need to check the adjustments on the exchanged PCB. The replacement boards are also pre-adjusted at the factory but if you wish to check them, use the procedures in paragraph 5-15 through 5-17.

CAUTION

Many components within the VR320 are extremely susceptible to static-discharge damage. Service the VR320 only in a static-free environment. Always observe standard handling precautions for static-sensitive devices.

5-15. UPS SENSE +5 VOLT ADJUSTMENT.

a. Verify that the UPS switch located on the rear of the unit near the AC power receptacle is in the enabled position (slide up to enable). Apply AC power. Let the unit run for a few minutes.

b. Locate the orange wire on the two pin plug assembly on the Front Panel I/O Control PCB. (See Figure 5-15.)

c. With a digital voltmeter measure the voltage between the orange wire and chassis ground. The reading obtained should be between 5.15 and 5.24 volts DC. Remember the reading.

d. Disconnect the AC line cord and adjust the potentiometer located on the right hand side of the UPS Sense/Battery Charger PCB so the reading is very close to, but no higher than the reading in step c.

5-16. BATTERY CHARGE +18 VOLT ADJUSTMENT.

a. Remove the red lead from the battery pack which is located at the top left hand corner of the UPS Sense/Battery Charger PCB.

b. Measure the voltage between the terminal and chassis ground. A reading of 18.8 to 18.9 volts DC should be obtained.

c. If the voltage is higher or lower adjust the potentiometer located between the two fuses on this board until the proper reading is obtained, then reconnect the red lead to the terminal.

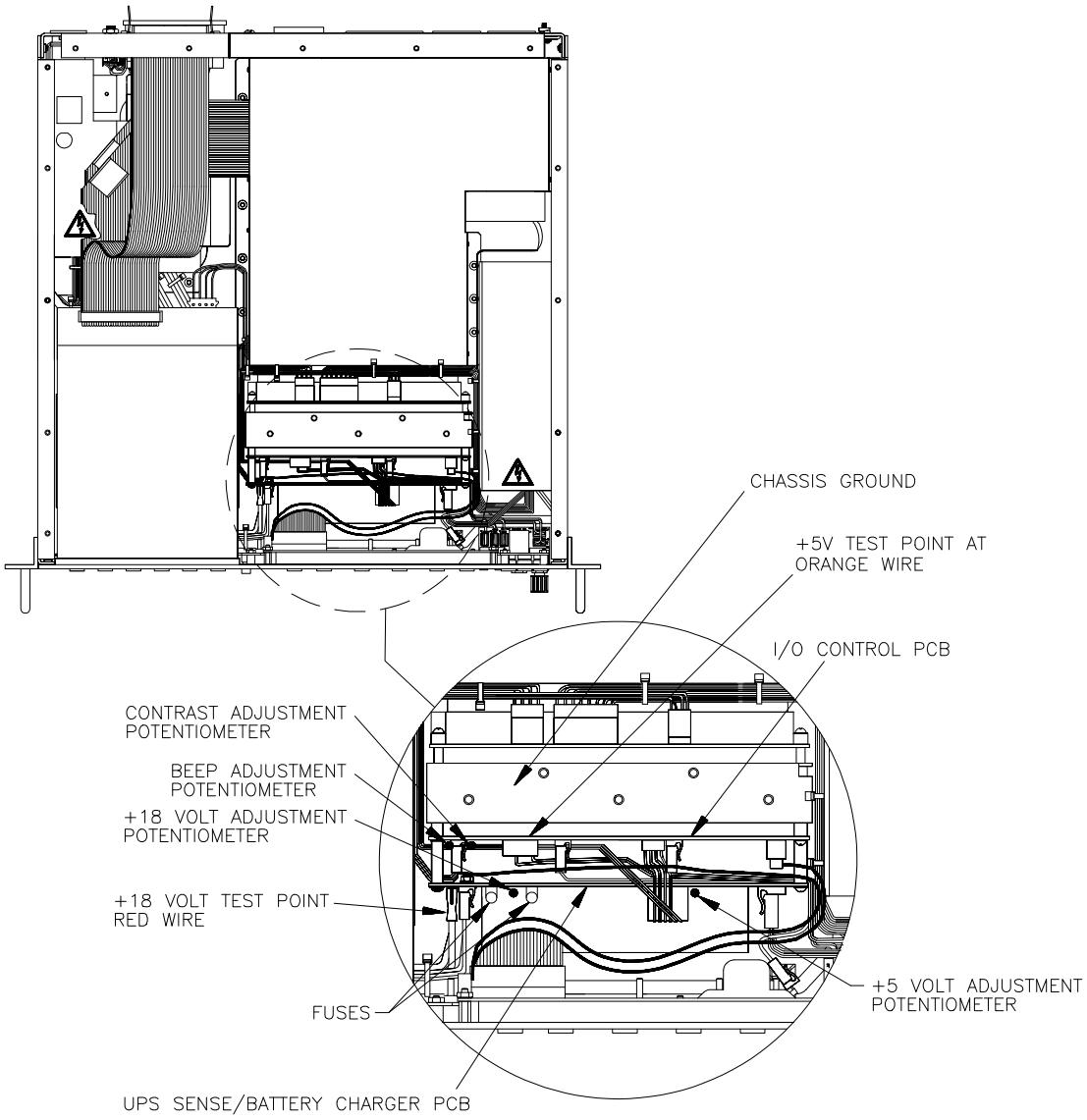


Figure 5-15. PCB Adjustment Pots

5-17. FRONT PANEL I/O CONTROL PCB BEEP AND DISPLAY CONTRAST ADJUSTMENT.

a. This board has two potentiometers located side by side near the top left hand corner of the board. The potentiometer on the far left is labeled “Beep” and is normally set in the middle. This potentiometer is used to adjust the level of the beep that can be heard coming from the speaker and in the headphones every time any key is pressed on the Front Panel PCB.

b. The second potentiometer from the left is labeled “Contrast” and is normally set in the middle. As the name implies this potentiometer is used to adjust the contrast of the Front Panel PCB display.

5-18. VR320 CPU-3 TIME CLOCK ADJUSTMENT.

NOTE

Tools required are a frequency counter with high impedance (10 Meg 10-1) probe and a trim-cap adjustment tool (Johanson P/N 4193-D or equivalent).

a. Set the UPS switch on the rear panel to DISABLED and remove the power cord.

b. Remove any plug-in input boards and set them aside and remove the top input board.

c. Remove the left rear panel (viewed from rear) (para. 5-6).

d. Locate U318 and C314 on the CPU 3 PCB (see Figure 5-16).

e. Attach the power cord to the recorder, wait approximately one minute.

f. Adjust C314 for exactly 8192Hz at U318 pin 23.

g. Remove the power cord.

h. Install the top input board and left rear panel.

i. Install remaining input boards (para. 5-5).

j. Set the UPS switch on the rear panel to ENABLE.

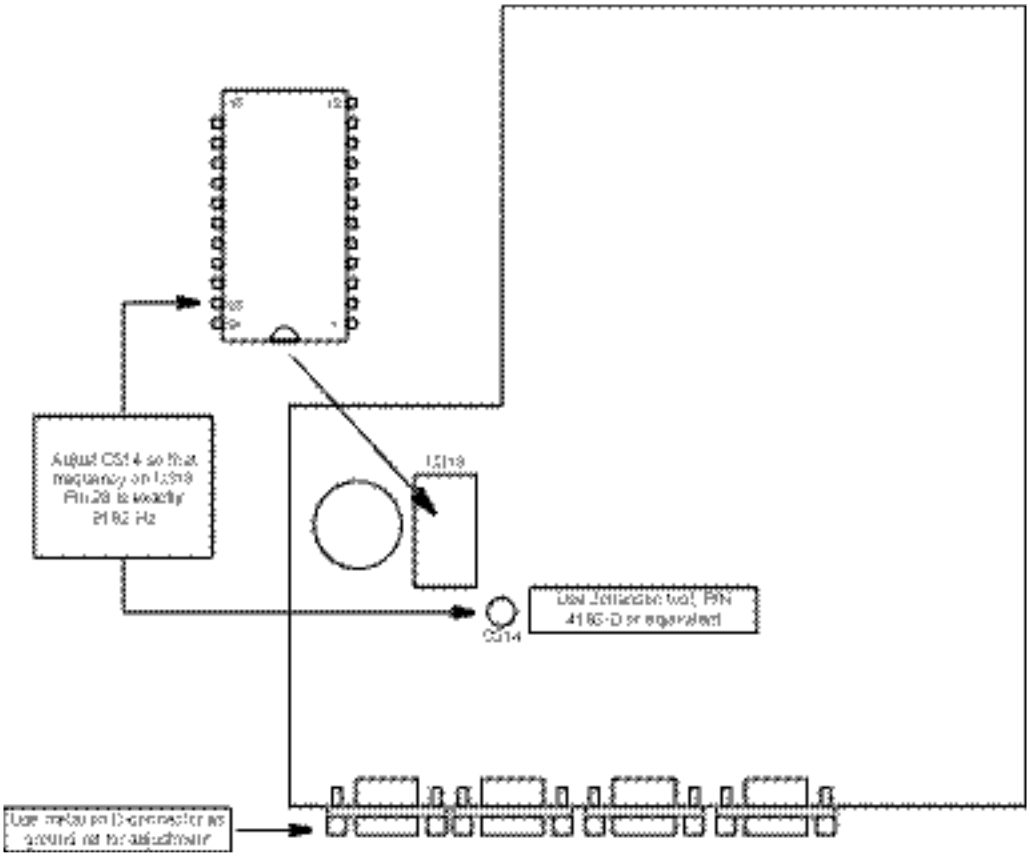


Figure 5-16. CPU 3 Time Clock Adjustment

Section V. CONNECTION LISTS

5-19. CABLE ASSEMBLIES.

NOMENCLATURE	FROM	DESTINATION
Fan Assy 105088	Fan	P1 Rear Pnl (with Condor Power Supply) P1 Power Supply (with ASTEC Power Supply)
Ribbon Cable 264010	J7 CPU 3 PCB	J1 I/O Control PCB
Ribbon Cable 264024	P1 (J8 I/O Control PCB)	P2 (J1 Front Panel Control Board)
Cable Assy 264027	P1 (J7 Motherboard)	P2 (J7 I/O Control PCB)
Cable Assy 264032	T1 (Transformer)	P1 (J2 UPS/Battery Sensor PCB)
Cable Assy 264035	P3 (J9 Motherboard)	P1 (J2 Drive A) & P2 (J2 Drive B)
Cable Assy 264045	P1 (J1 Power Supply)	Line Filter
Cable Assy 264053	Fuse and Line Filter	Transformer
Cable Assy 264058	P3 (J9 Motherboard)	P1 (J2 Drive A) P2 (J2 Drive B) P4 (J2 Drive B)
SCSI Cable 264070	Drive A Drive B	J301 UPS 3 PCB J302 UPS 3 PCB
Cable Assy 264089	P1 (J5 I/O Control PCB)	P2 (J6 Front Panel Connector Board)
Cable Assy 264090	P1 (I/O Control PCB)	LCD Display
Cable Assy 264091	P2 (J6 I/O Control PCB) P3 (Rear Panel	P1 (J4 UPS/Battery Sensor PCB)
Cable Assy 264092	P2 Rear Panel	P1 (J8 Front Panel Connector Board)
Cable Assy 264094	P3 Rear Panel Jack	P1 Speaker P2 (J7 Front Panel Connector Board)

Ribbon Cable 264095	P1 (Front Panel Control Board)	P2 (I/O Control PCB)
Ribbon Cable 264096	P1 (LCD Display)	P2 (J3 I/O Control PCB)
Cable Assy 264097	P1 (J10 I/O Control PCB)	P2 (J5 Front Panel Connector Board)
Cable Assy 264098	P1 (J9 I/O Control PCB)	P2 (J4 Front Panel Connector Board)
Cable Assy 264107	P1 (J1 Power-One Power Supply)	Line Filter
Cable Assy 264108	P1 (J1 ASTEC Power Supply)	Line Filter
Cable Assy 264044 (See Figure 5-17 Wiring Diagram)	P1 (J2 Condor Power Supply)	P2 (J8 Motherboard) P3 (J3 UPS/Battery Sensor PCB) P4 (J9 I/O Control PCB)

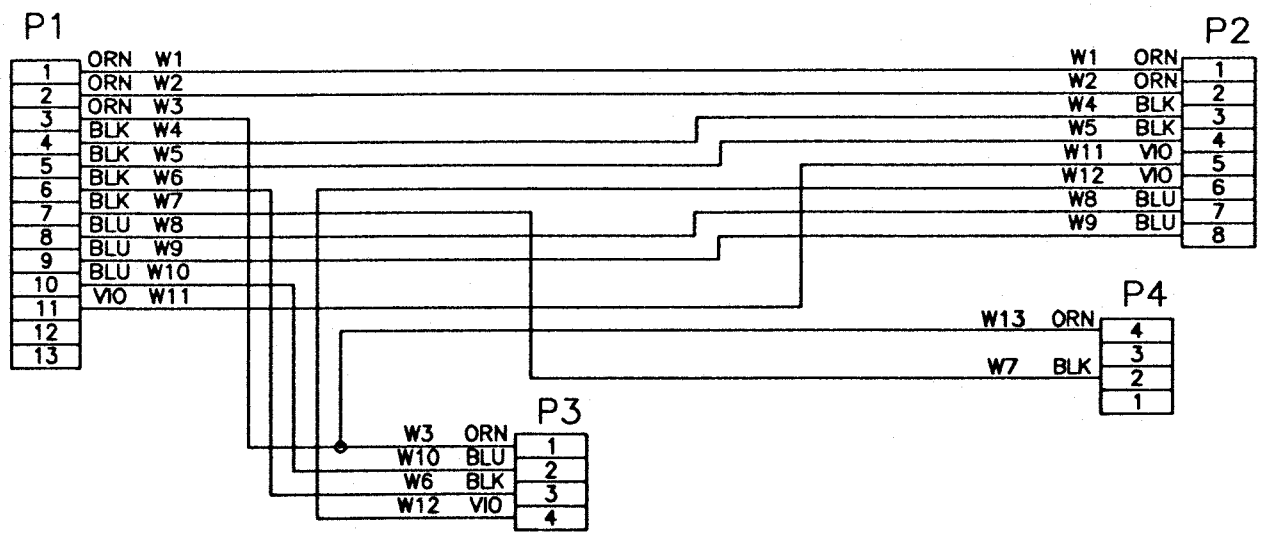


Figure 5-17. Wiring Diagram for CONDOR Power Supply

NOMENCLATURE	FROM	DESTINATION
Cable Assy 264106 (See Figure 5-18 Wiring Diagram)	P1 (J2 ASTEC Power Supply)	P2 (J8 Motherboard) P3 (J3 UPS/Battery Sensor PCB) P4 (J9 I/O Control PCB) P5 (To Fan Assy)

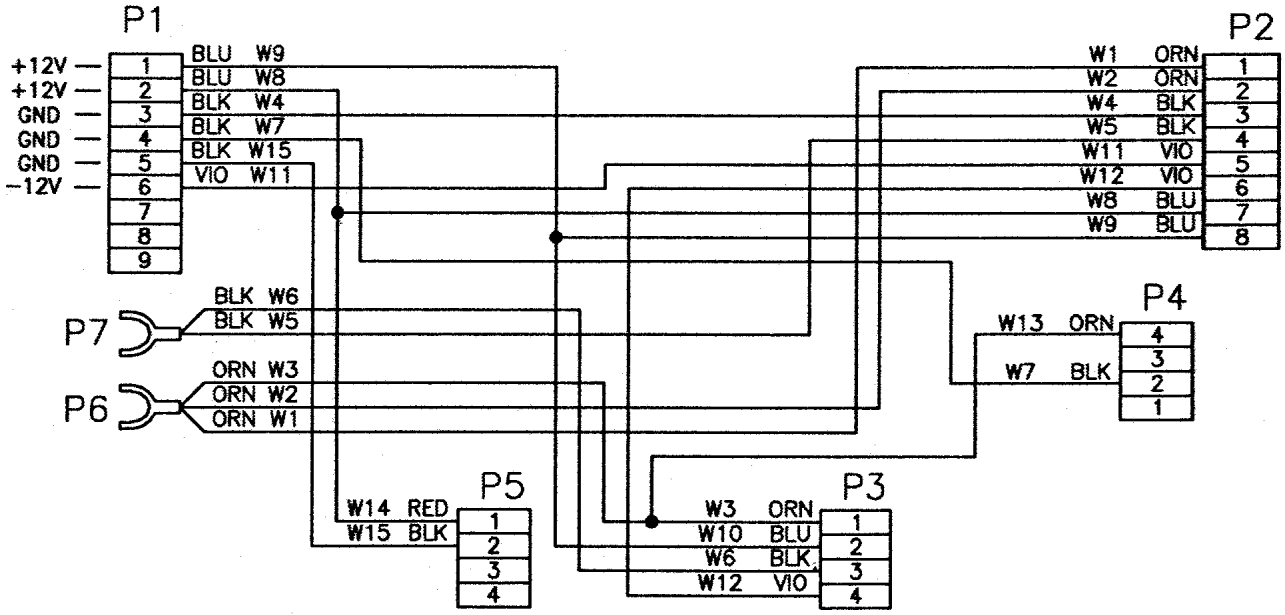


Figure 5-18. Wiring Diagram for ASTEC Power Supply

5-20. UPS/SENSOR BATTERY CHARGER PCB.

CONNECTOR	FROM/TO	REMARKS
J2	T1 (Transformer)	Cable Assy 264032
J6	Battery Bracket Assy	
J1	Battery Bracket Assy	
J3	J2 (Power Supply)	Cable Assy 264044
	P2 (J6 I/O Control PCB)	Cable Assy 264106
J4	P3 Rear Panel	Cable Assy 264091
J5	Battery Bracket Assy	Cable Assy 264091

5-21. FRONT PANEL I/O CONTROL PCB.

CONNECTOR	FROM/TO	REMARKS
J8	J1 (Front Panel Control Board)	Ribbon Cable 264024
J7	J7 (Motherboard)	Cable Assy 264027
J1	J7 CPU 3 PCB	Ribbon Cable 264010
J3	P1 (LCD Display)	Ribbon Cable 264096
J9	J2 Power Supply (ASTEC)	Main Power Assy Cable 264106
J5	J6 (Front Panel Connector Board)	Cable Assy 264089
J10	P2 (Front Panel Connector Board)	Cable Assy 264097
J4	LCD Display	Cable Assy 264090
J6	J4 (UPS/Battery Sensor PCB)	Cable Assy 264091
	P3 Rear Panel	Cable Assy 264091
J9	P2 (Front Panel Connector Board)	Cable Assy 264098

5-22. MOTHERBOARD.

CONNECTOR	FROM/TO	REMARKS
J7	J4 (I/O Control PCB)	Cable Assy 264027
J9	J4 (Drive A) and J2 (Drive B)	Cable Assy 264035
J8	J2 (Power Supply)	Cable Assy 264044
J9	J2 (Drive A), J2 (Drive B), J2 (Drive B)	Cable Assy 264058

5-23. UPS 3 PCB.

CONNECTOR	FROM/TO	REMARKS
J301	Drive A	SCSI Cable 264070
J302	Drive B	SCSI Cable 264070
		UPS Cable Assembly 264091
J7	J1 (I/O Control Board)	Ribbon Cable 264010

5-24. TRANSFORMER.

CONNECTOR	FROM/TO	REMARKS
T1-1	J2 UPS/Battery Sensor PCB	Cable Assy 264032
T1-2		
T1-3		

5-25. POWER SUPPLY.

CONNECTOR	FROM/TO	REMARKS
J1 (Condor)	Line Filter	Cable Assy 264045
J1 (Power-One)	Line Filter	Cable Assy 264107
J1 (ASTEC)	Line Filter	Cable Assy 264108
J2 (Condor)	J8 Motherboard	Cable Assy 264044
	J3 UPS/Battery Sensor PCB	Cable Assy 264044
	J9 I/O Control PCB	Cable Assy 264044
J2 (ASTEC)	J8 Motherboard	Cable Assy 264106
	J3 UPS/Battery Sensor PCB	Cable Assy 264106
	J9 I/O Control PCB	Cable Assy 264106
	To Fan Assy	Cable Assy 264106

5-26. FAN ASSEMBLY.

CONNECTOR	FROM/TO	REMARKS
P1	Rear Panel	With Condor Power Supply (see Figure 5-6)
P1	Power Supply	With ASTEC Power Supply (see Figure 5-7)

5-27. DRIVES.

CONNECTOR	FROM/TO	REMARKS
J2 (Drive A) J2 (Drive B)	J9 (Motherboard)	Cable Assy 264035
J2 (Drive A) J2 (Drive B) J2 (Drive B)	J9 Motherboard	Cable Assy 264058
SCSI Connector Drive A	J301 UPS 3 PCB	SCSI Cable 264070
SCSI Connector Drive B	J302 UPS 3 PCB	SCSI Cable 264070

5-28. REAR PANEL.

CONNECTOR	FROM/TO	REMARKS
P2	P1 (J8 Front Panel Connector Board)	Line Out/Relay Cable Assy 264092
P3	P1 (J4 UPS/Battery Sensor PCB)	UPS Cable Assy 264091
P3 (Stereo jack)	P1 (J7 Front Panel Connector Board)	Speaker Cable Assy 264094

5-29. FRONT PANEL CONNECTOR BOARD.

CONNECTOR	FROM/TO	REMARKS
J6	P1 (J5 I/O Control PCB)	Cable Assy 264089
J7	P1 (Speaker) P3 (Rear Panel Jack)	Cable Assy 264094
J5	J10 (I/O Control PCB)	Cable Assy 264097
J4	J9 (I/O Control PCB)	Cable Assy 264098

CHAPTER 6
PARTS LIST

6-1. PARTS LIST.

This chapter provides the parts list for the VR320. It identifies the parts necessary for equipment support. Illustrations provide aid in identifying parts for requisitioning.

6-2. PARTS LIST COLUMNS.

6-2.1 Fig., and Item No. Figure and item numbers are assigned to each part in order to determine an exact illustrated location for each part. Item numbers that are not illustrated are listed with a dash (-) preceding the item number.

6-2.2 Part Number. This column provides the manufacturer's part number for each part in the listing.

6-2.3 Description. The item description is assigned according to the nomenclature placed in the drawing title block. The noun name is listed, followed by modifiers and descriptive information to completely identify the part.

Base Part Number 1108 **Table 6-1. Configuration Table**

DASH #	DESCRIPTION	VOLTAGE	BOARD 1
-001	EVENTIDE (1) TAPE (1) DISK UNIT	115V	16 CHANNEL – TELCO
-002	EVENTIDE (2) TAPE (1) DISK UNIT	115V	16 CHANNEL – TELCO
-003	EVENTIDE (1) TAPE (1) DISK UNIT	230V	16 CHANNEL – TELCO
-004	EVENTIDE (2) TAPE (1) DISK UNIT	230V	16 CHANNEL – TELCO
-005	EVENTIDE (1) TAPE (1) DISK UNIT	115V	8 CHANNEL – TELCO
-006	EVENTIDE (2) TAPE (1) DISK UNIT	115V	8 CHANNEL – TELCO
-007	EVENTIDE (1) TAPE (1) DISK UNIT	230V	8 CHANNEL – TELCO
-008	EVENTIDE (2) TAPE (1) DISK UNIT	230V	8 CHANNEL – TELCO
-009	EVENTIDE (1) TAPE (1) DISK UNIT	115V	32 CHANNEL – TELCO (2) 16 CHANNEL BOARDS
-010	EVENTIDE (2) TAPE (1) DISK UNIT	115V	
-011	EVENTIDE (1) TAPE (1) DISK UNIT	230V	
-012	EVENTIDE (2) TAPE (1) DISK UNIT	230V	

6-2.4 Usable On Code. Part variations between the different configurations are indicated by letter symbols placed in the USABLE ON CODE column of the parts list. When parts are used on all configurations, the column is left blank. The configuration table matches the dash numbers of different configurations to the number of tape drives, disk drives, voltage, and board channels.

6-2.5 Qty. This column lists the number of units required per assembly or subassembly.

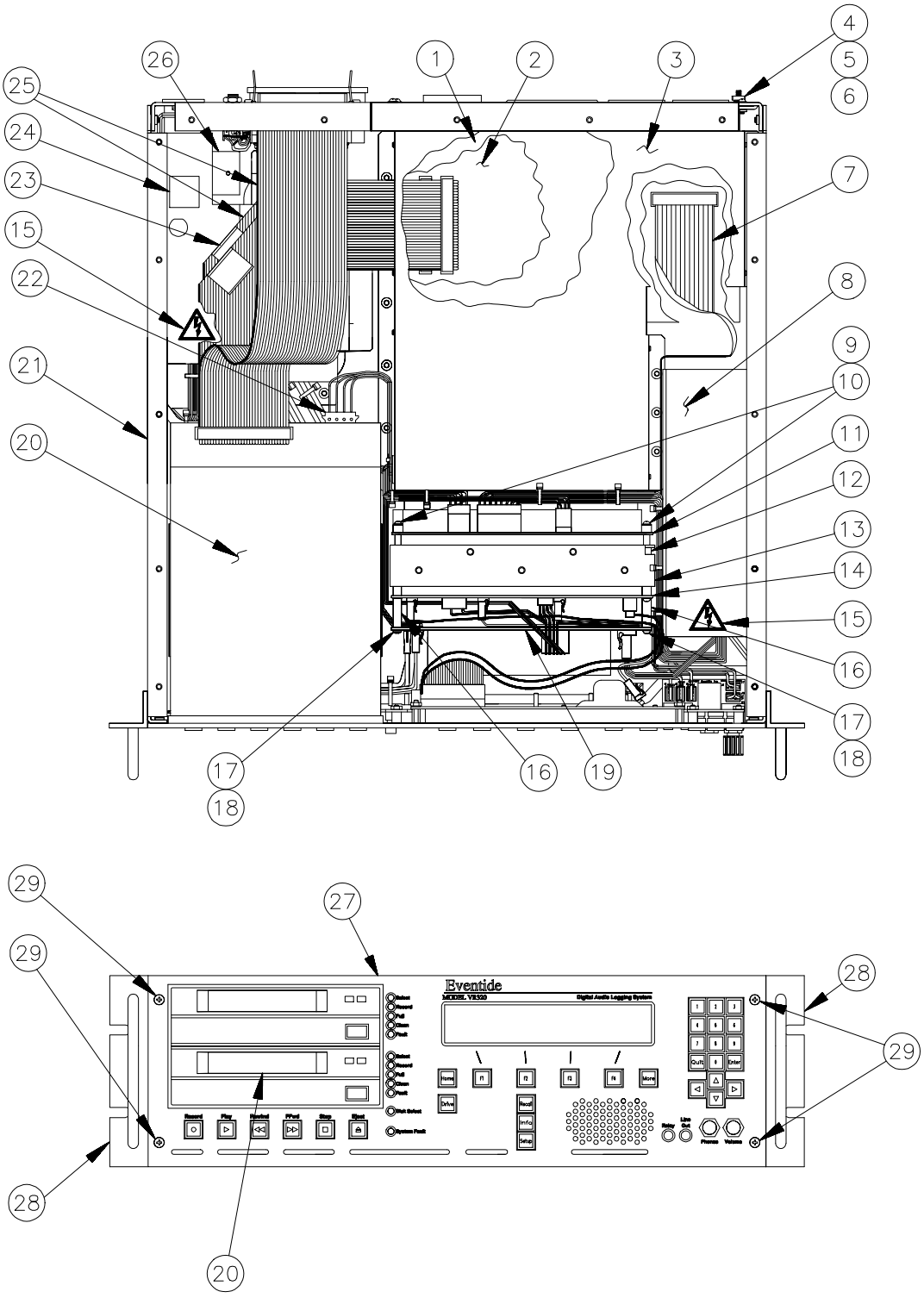


Figure 6-1. Audio Logging Recorder (Top and Front Views)

FIG. AND ITEM NO.	PART NUMBER	DESCRIPTION	USABLE ON CODE	QTY
6-1	1108-001	AUDIO LOGGING RECORDER	A	RF
	1108-002	AUDIO LOGGING RECORDER	B	RF
	1108-003	AUDIO LOGGING RECORDER	C	RF
	1108-004	AUDIO LOGGING RECORDER	D	RF
	1108-005	AUDIO LOGGING RECORDER	E	RF
	1108-006	AUDIO LOGGING RECORDER	F	RF
	1108-007	AUDIO LOGGING RECORDER	G	RF
	1108-008	AUDIO LOGGING RECORDER	H	RF
	1108-009	AUDIO LOGGING RECORDER	I	RF
	1108-010	AUDIO LOGGING RECORDER	J	RF
	1108-011	AUDIO LOGGING RECORDER	K	RF
	1108-012	AUDIO LOGGING RECORDER (SEE CONFIGURATION TABLE 6-1)	L	RF
1	102072	INPUT BD, 8 CHANNEL AUDIO	E,F,G,H	1
	102101	INPUT BD, 16 CHANNEL AUDIO	A,B,C,D,I, J,K,L	1
2	102113	CPU III BOARD ASSEMBLY		1
3	105021	PCB CAGE ASSEMBLY		1
4	321086	WASHER, #6, SPLIT-LOCK		4
5	321026	NUT, #6, ¼ HEX		4
6	321027	WASHER, #6, INTERNAL STAR		2
7	264010	CABLE ASSY, CPU TO REAR I/O		1
8	324139	POWER SUPPLY COVER		1
9	321012	WASHER, #4, INTERNAL STAR		4
10	321122	SCREW, #4-40 X 7/8, PAN HD, SLOTTED		4
11	102050	MOTHERBOARD ASSEMBLY		1
12	324128	STANDOFF, #4-40 X 1-1/4, ¼ HEX		4
13	300205	MOTHERBOARD BRACKET		
14	102110	I/O CONTROL BOARD ASSEMBLY		1
15	429018	LABEL, SHOCK, HAZARD		2
16	324188	STANDOFF, ¼ HEX, MALE-FEMALE		2
17	321002	SCREW, #4-40 X ¼, ROUND HD, PHILLIPS		12
18	321013	WASHER, #4 SPLIT-LOCK		8
19	102054	UPS BOARD ASSEMBLY		1
20	105079-001	MEDIA DRIVE ASSEMBLY (1 DRIVE, HARD DISK) (SEE FIGURE 6-12 FOR DETAILS)	A,C,E,G,I,J ,K,L	1
	105079-002	MEDIA DRIVE ASSEMBLY (2 DRIVES, HARD DISK) (SEE FIGURE 6-12 FOR DETAILS)	B,D,F,H,J, K	1
21	300201	CHASSIS		1
22	264058	CABLE ASSY, MOTHERBOARD TO DRIVES		1
23	324136	ADHESIVE RIBBON CABLE CLAMP		2

FIG. AND ITEM NO.	PART NUMBER	DESCRIPTION	USABLE ON CODE	QTY
24	429041	LABEL, TRANSFORMER FUSE		1
25	264070	CABLE ASSY, CPU TO DRIVES		1
26	300279	PARTITION		1
27	105077	FRONT PANEL ASSEMBLY (SEE FIGURE 6-2 FOR DETAILS)		1
28	300379	RACK, EAR		2
29	321023	SCREW, #6-32 X 5/16, FLAT HD, PHILLIPS, BLK		4
-30	300393	REAR COVER PLATE	E,F,G,H	1
-31	425001	AC LINE CORD, 3 COND.		1
-32	264099	WIRING BLOCK DIAGRAM	A,B,C,D,I, J,K,L	1

- NOT ILLUSTRATED
RF – REFERENCED

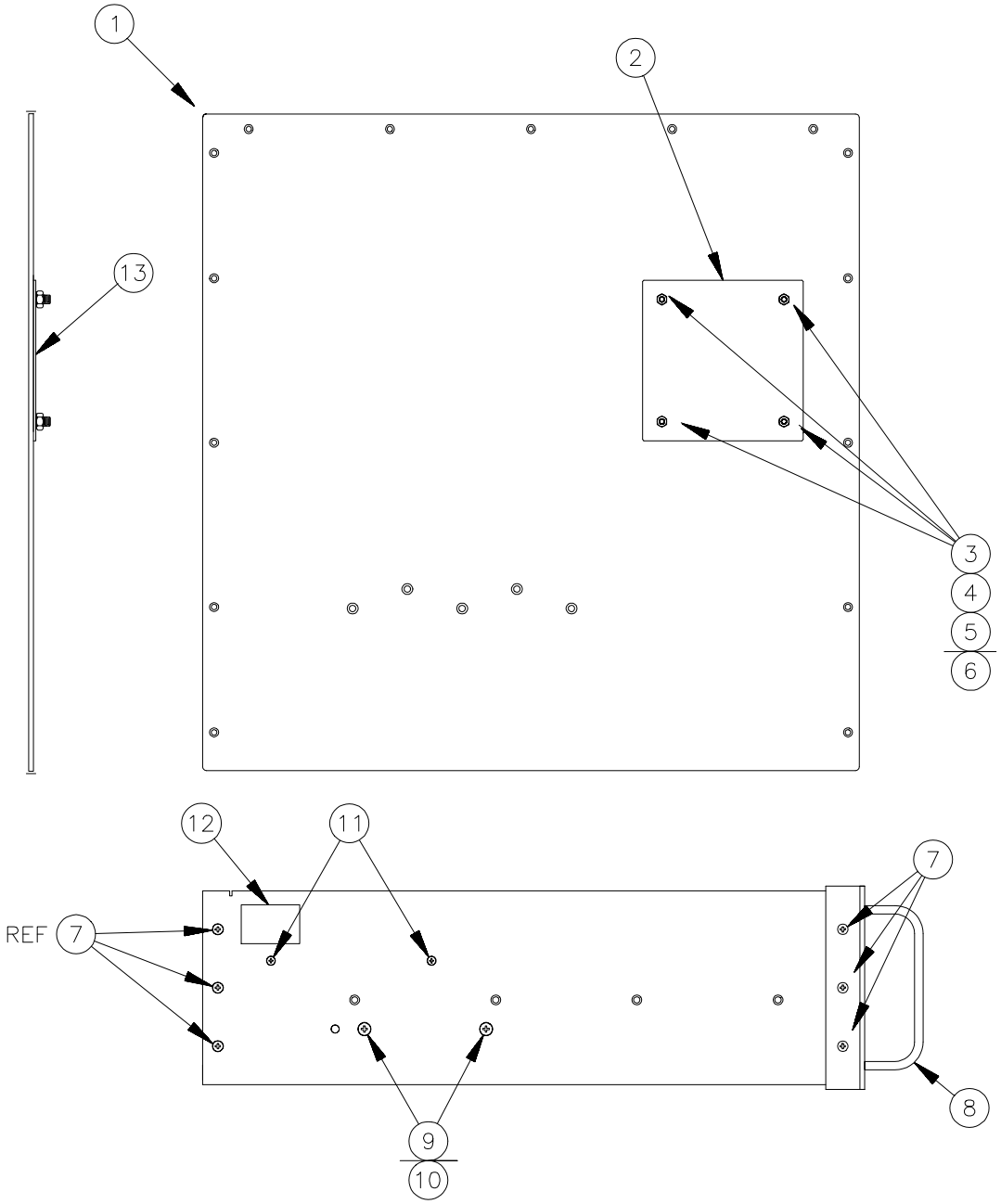


Figure 6-2. Top Cover and Left Side View

FIG. AND ITEM NO.	PART NUMBER	DESCRIPTION	USABLE ON CODE	QTY
6-2		AUDIO LOGGING RECORDER (TOP COVER AND LEFT SIDE VIEW)		AF
1	300202	TOP COVER		
2	300395	COVER PLATE, SPEAKER		1
3	321012	WASHER, #4, INTERNAL STAR		4
4	321014	NUT, #4-40, ¼ HEX		4
5	321028	WASHER, #6 FLAT		4
6	321009	SCREW, #4-40 X 5/16, FLAT HD, PHILLIPS, BLK		4
7	321023	SCREW, #6-32 X 5/16, FLAT HEAD, PHILLIPS, BLK		4
8	324189	RACK HANDLE		1
9	321120	SCREW, #8-32 X ½, FLAT HD, PHILLIPS, BLK		2
10	321137	NUT, #8-32, ELASTIC STOP		2
11	321010	SCREW, #4-40 X ¼, FLAT HD, PHILLIPS, BLK		2

RF – REFERENCED

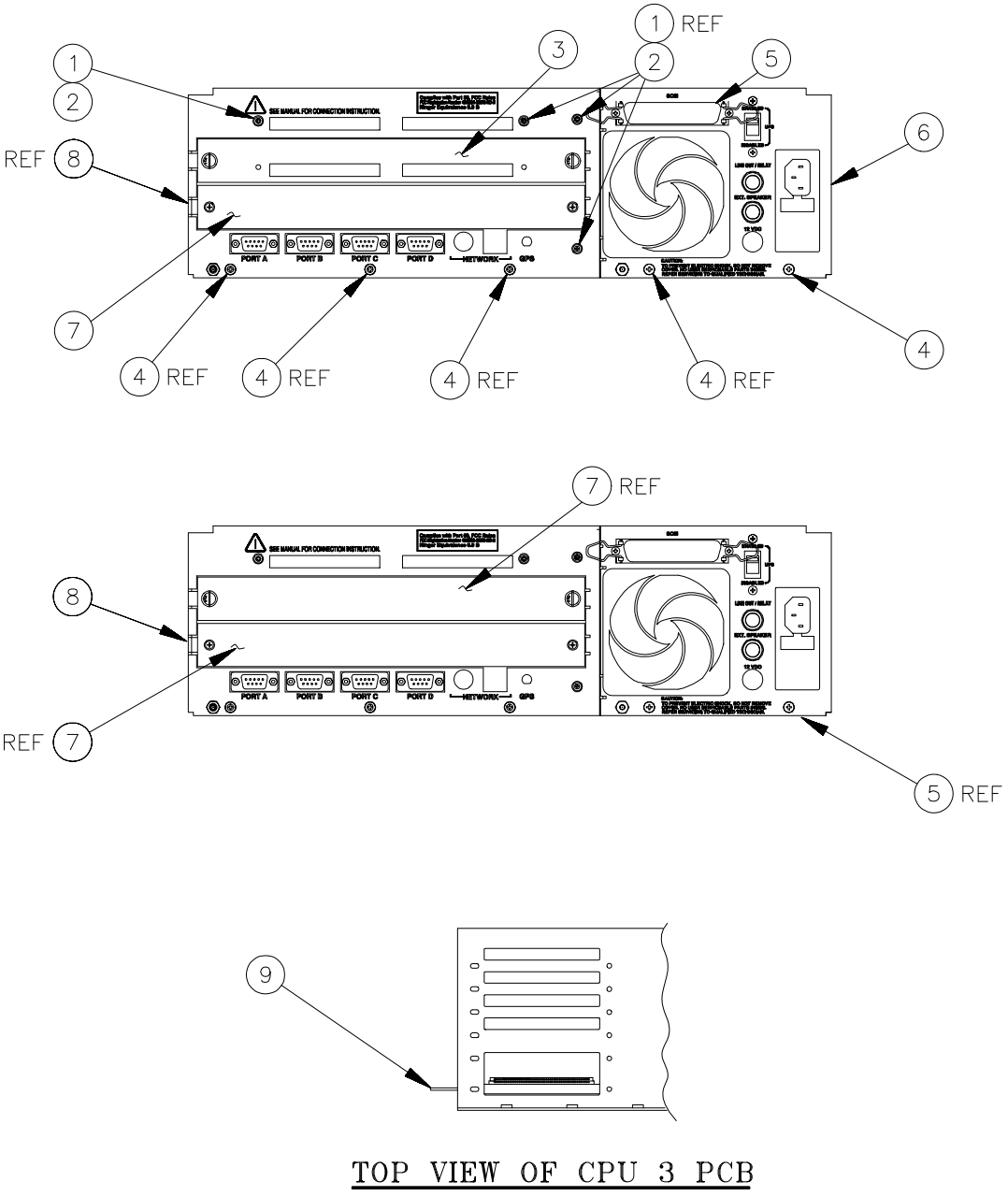


Figure 6-3. Rear Panel View and CPU 3 PCB

FIG. AND ITEM NO.	PART NUMBER	DESCRIPTION	USABLE ON CODE	QTY
6-3		AUDIO LOGGING RECORDER (REAR PANEL VIEW AND CPU 3 PCB)		RF
1	321012	WASHER, #4, INTERNAL STAR		4
2	321002	SCREW, #4-40 X ¼, RD HD, PHILLIPS		4
3	300373	PLATE, 16 CHANNEL INPUT	I,J,K,L	1
4	321023	SCREW, #6-32 X 5/16, FLAT HD, PHILLIPS, BLK		5
5	312349	EXTERNAL SCSI TERMINATOR		1
6	105078	RIGHT REAR PANEL ASSEMBLY		1
7	300256 300256	BLANK PLATE BLANK PLATE	A,B,C,D,E, F,G,H,I,J, K,L	2 1
8	302015	LEFT REAR PANEL		1
9	102113	CPU III BOARD ASSEMBLY (SEE FIGURE 6-1, ITEM 3 FOR LOCATION)		1

RF – REFERENCED

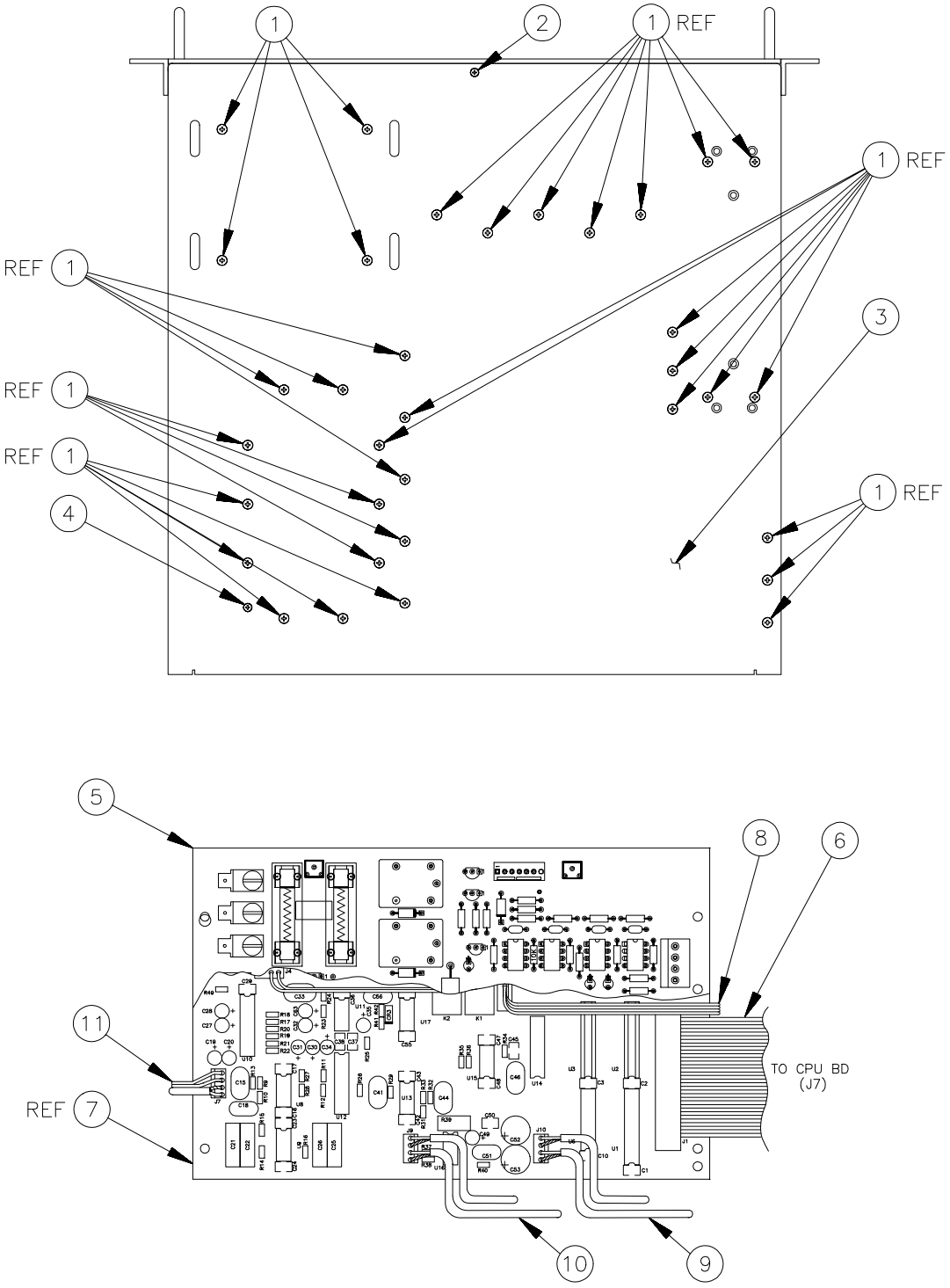


Figure 6-4. Chassis, UPS and I/O Control PCBs

FIG. AND ITEM NO.	PART NUMBER	DESCRIPTION	USABLE ON CODE	QTY
6-4		AUDIO LOGGING RECORDER (CHASSIS, UPS AND I/O CONTROL PCBs) (SEE FIGURE 6-1, ITEMS 14, 19, AND 21 FOR LOCATION)		RF
1	321023	SCREW, #6-32 X 5/16, FLAT HD, PHILLIPS, BLK		34
2	321009	SCREW, #4-40 X 5/16, FLAT HD, PHILLIPS, BLK		1
3	300201	CHASSIS		1
4	321122	SCREW, #4-40 X 7/8, PAN HD, SLOTTED		1
5	102054	UPS BOARD ASSEMBLY		1
6	264010	CABLE ASSY, CPU TO REAR I/O		1
7	102110	I/O CONTROL BOARD ASSEMBLY		1
8	264089	RELAY CABLE I/O TO FRONT PANEL		1
9	264097	CABLE ASSY, LINE/HEAD PHONE		1
10	264098	CABLE ASSY, VOLUME		1
11	264027	CABLE ASSY, MOTHERBOARD TO I/O CONTROL		1

RF – REFERENCED

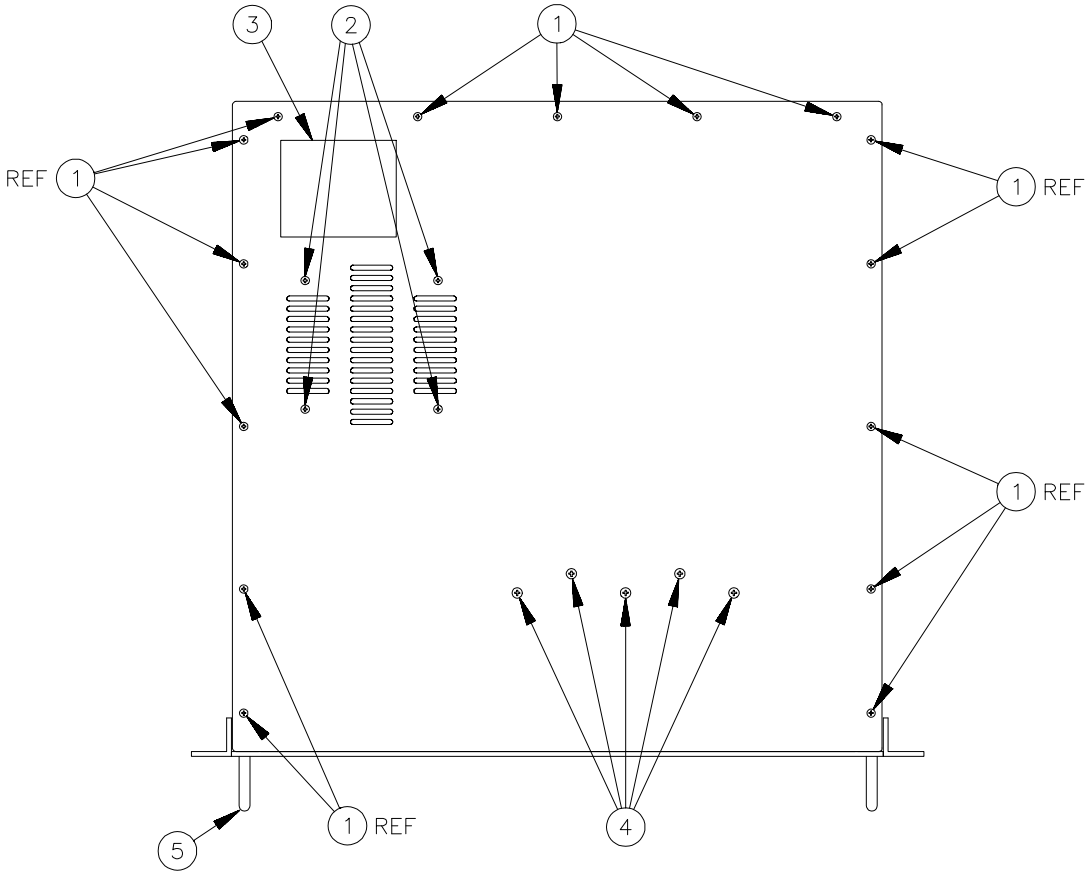


Figure 6-5. Top View with Cover Installed

FIG. AND ITEM NO.	PART NUMBER	DESCRIPTION	USABLE ON CODE	QTY
6-5		AUDIO LOGGING RECORDER (TOP VIEW WITH COVER INSTALLED)		RF
1	321010	SCREW, #4-40 X ¼, FLAT HD, PHILLIPS, BLK		15
2	321009	SCREW, #4-40 X 5/16, FLAT HD, PHILLIPS, BLK		4
3	429034	LABEL, TRADEMARK		1
4	321023	SCREW, #6-32 X 5/16, FLAT HD, PHILLIPS, BLK		5

RF – REFERENCED

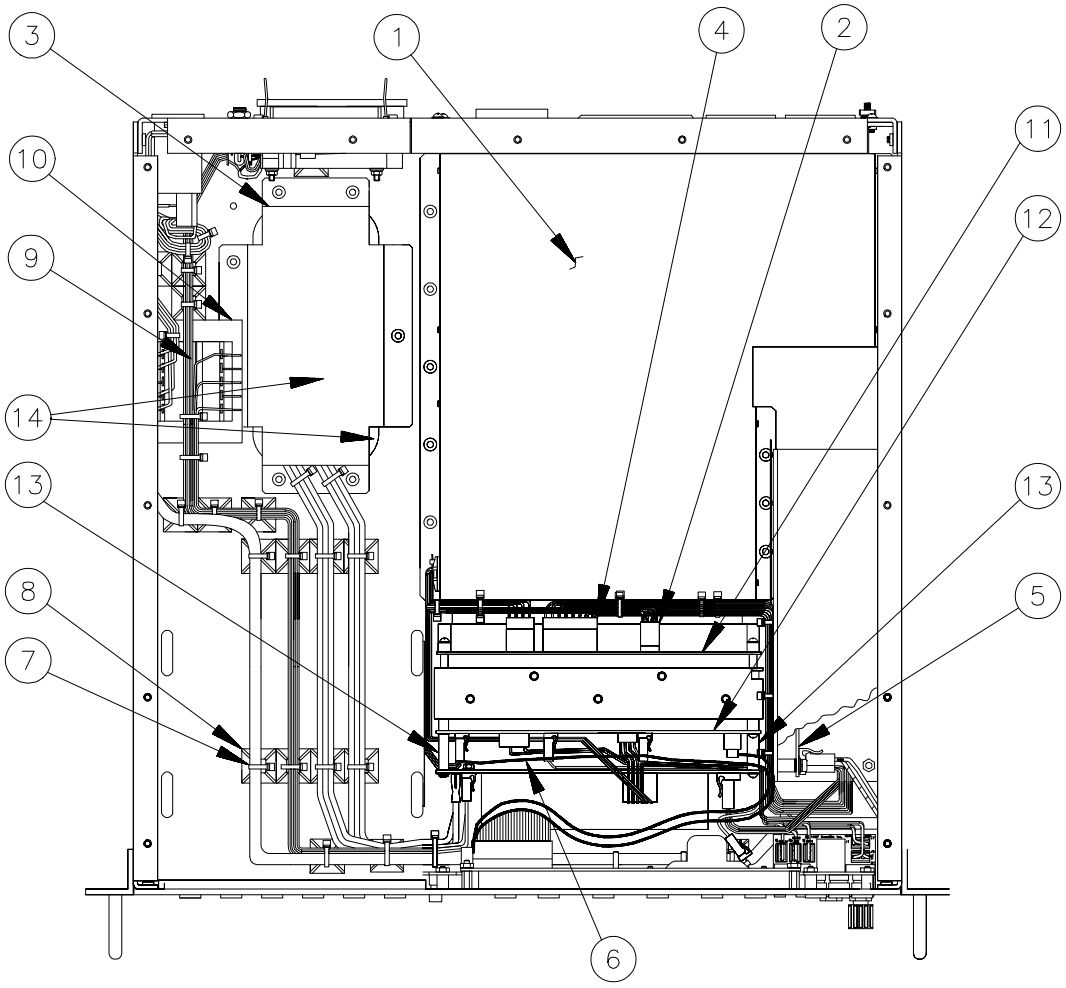
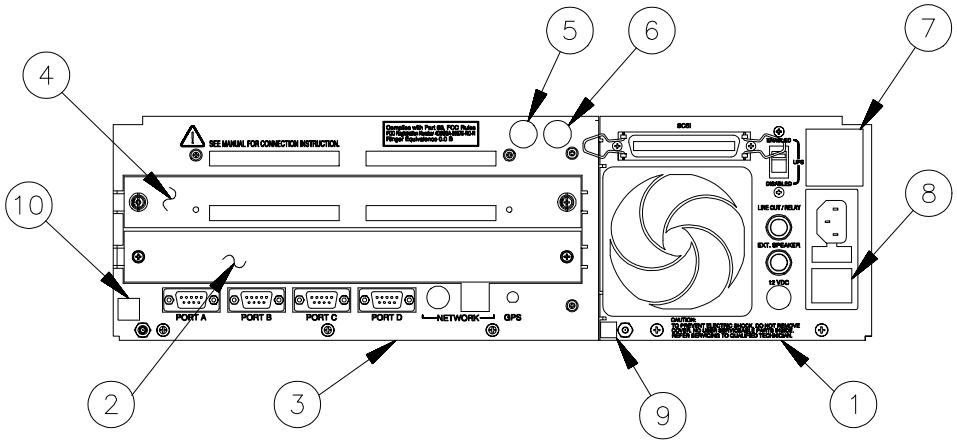
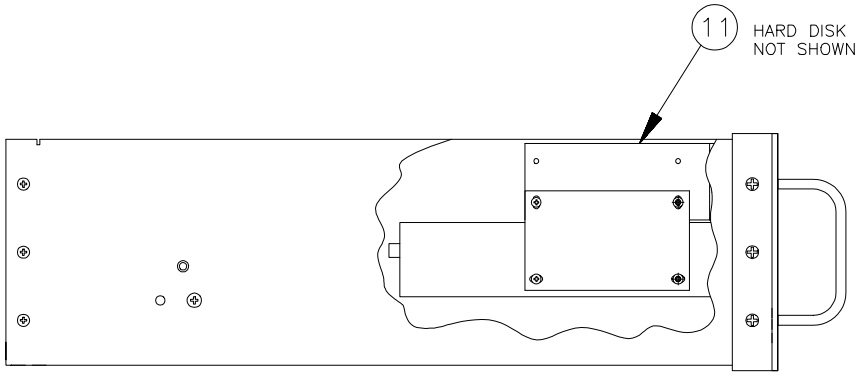


Figure 6-6. Top View (Top Cover, Partition, and Power Supply Cover Removed)

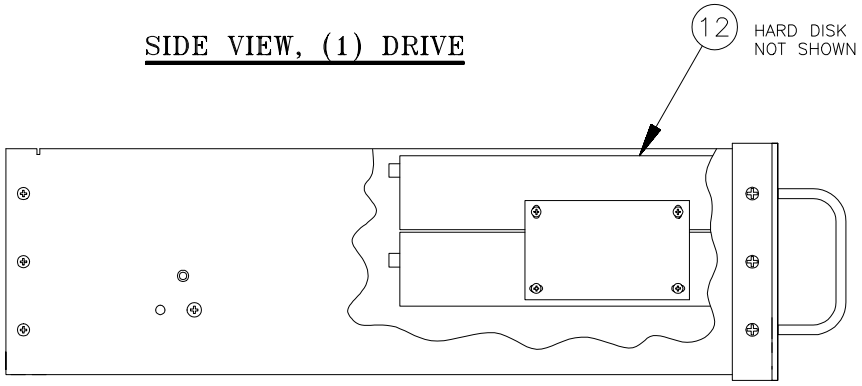
FIG. AND ITEM NO.	PART NUMBER	DESCRIPTION	USABLE ON CODE	QTY
6-6		AUDIO LOGGING RECORDER (TOP VIEW WITH TOP COVER, PARTITION, AND POWER SUPPLY COVER REMOVED)		RF
1	105021	PCB CAGE ASSEMBLY		1
2	264027	CABLE ASSY, MOTHERBOARD TO I/O CONTROL		1
3	105017	BATTERY BRACKET ASSEMBLY		1
4	264044	CABLE ASSY, MAIN P.S. TO I/O, UPS, MOTHERBOARD		1
5	427042	POWER SUPPLY		1
6	264096	CABLE ASSY, I/O CONTROL BD TO LCD DISPLAY		1
7	425009	TYWRAPS		55
8	425067	ADHESIVE MOUNT FOR TYWRAPS		15
9	264032	CABLE ASSY, TRANSFORMER TO UPS BOARD		1
10	423047	TRANSFORMER		1
11	102050	MOTHERBOARD ASSEMBLY		1
12	102110	I/O CONTROL BOARD ASSEMBLY		1
13	324188	STANDOFF, ¼ HEX, MALE-FEMALE		2
14	324055	TAPE, FOAM, 1/8 THK, ½” W, BLK		4”

RF – REFERENCED





SIDE VIEW, (1) DRIVE

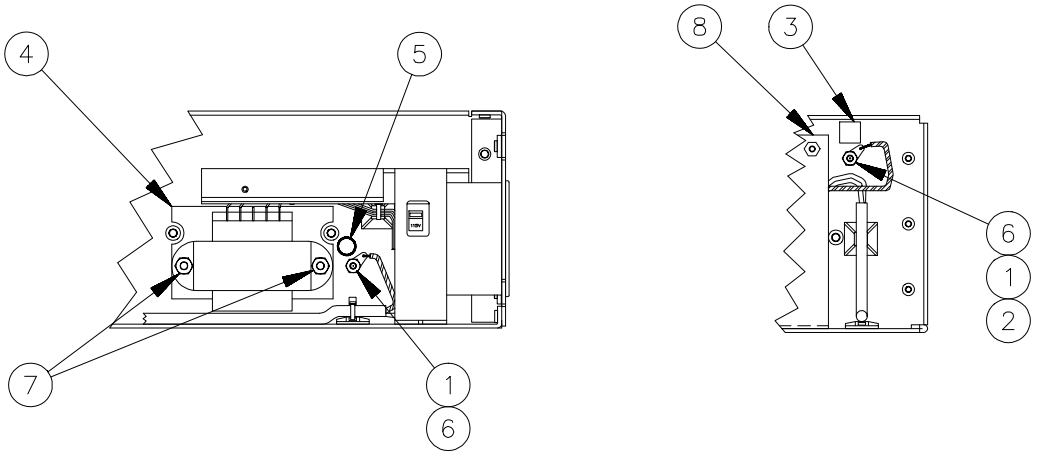


SIDE VIEW, (2) DRIVES

Figure 6-7. Rear Panel and Side View (Showing Drives)

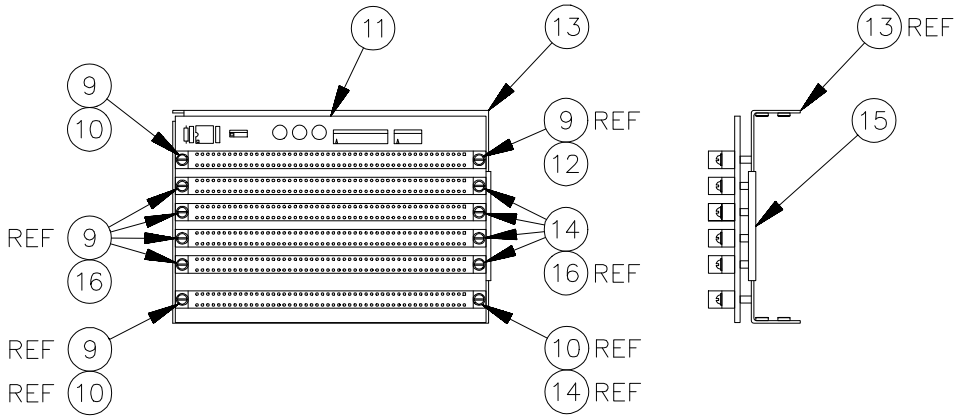
FIG. AND ITEM NO.	PART NUMBER	DESCRIPTION	USABLE ON CODE	QTY
6-7		AUDIO LOGGING RECORDER (REAR VIEW AND SIDE VIEWS SHOWING DRIVES)		RF
1	105078	RIGHT REAR PANEL ASSEMBLY		1
2	300256 300256	BLANK PLATE BLANK PLATE	A,B,C,D,E, F,G,H,I,J, K,L	2 1
3	302015	LEFT REAR PANEL		1
4	300338	TELCO BOARD PLATE	E,F,G,H	1
5	429020	LABEL, UL LISTED		1
6	429025	LABEL, CSA		1
7	429073	LABEL, NAME & RATING		1
8	429072	LABEL, US/CA FUSE		1
9	429057	LABEL, GROUND SYMBOL		1
10	429038	LABEL, GROUND SYMBOL SQUARE		2
11	105079-001	MEDIA DRIVE ASSEMBLY (1 DRIVE, HARD DISK) (SEE FIGURE 6-12 FOR DETAILS)	A,C,E,G,I, J, K,L	1
12	105079-002	MEDIA DRIVE ASSEMBLY (2 DRIVES, HARD DISK) (SEE FIGURE 6-12 FOR DETAILS)	B,D,F,H, J,K	1

RF – REFERENCED



INSIDE VIEW OF LEFT REAR PANEL

POWER SUPPLY FRONT VIEW



MOTHERBOARD

CPU 3 PCB, PCB CAGE ASSY,
AND SPEAKER COVER PLATE REMOVED

SIDE VIEW
OF MOTHERBOARD

Figure 6-8. Right Rear Panel, Power Supply Front View, Motherboard, and Motherboard Bracket

FIG. AND ITEM NO.	PART NUMBER	DESCRIPTION	USABLE ON CODE	QTY
6-8		AUDIO LOGGING RECORDER (RIGHT REAR PANEL, POWER SUPPLY FRONT VIEW, MOTHERBOARD, AND MOTHERBOARD BRACKET)		RF
1	321086	WASHER, #6, SPLIT-LOCK		1
2	321026	NUT, #6, ¼ HEX		1
3	429038	LABEL, GROUND SYMBOL SQUARE		1
4	324135	INSULATOR, TRANSFORMER		1
5	429017	LABEL, GROUND SYMBOL, ROUND		1
6	324131	GROUND LUG #6, W/INTERNAL STAR		2
7	312349	EXTERNAL SCSI TERMINATOR		1
8	324139	POWER SUPPLY COVER		1
9	321012	WASHER, #4, INTERNAL STAR		12
10	321122	SCREW, #4-40 X 7/8, PAN HD, SLOTTED		4
11	102050	MOTHERBOARD ASSEMBLY		1
12	300373	PLATE, 16 CHANNEL INPUT	I,J,K,L	4
13	300205	MOTHERBOARD BRACKET		
14	321023	SCREW, #6-32 X 5/16, FLAT HD, PHILLIPS, BLK		4
15	425045	GROMMET, PLASTIC		2.5”
16	321066	SCREW, #4-40 X ½, PAN HD, SLOTTED		8

RF - REFERENCED

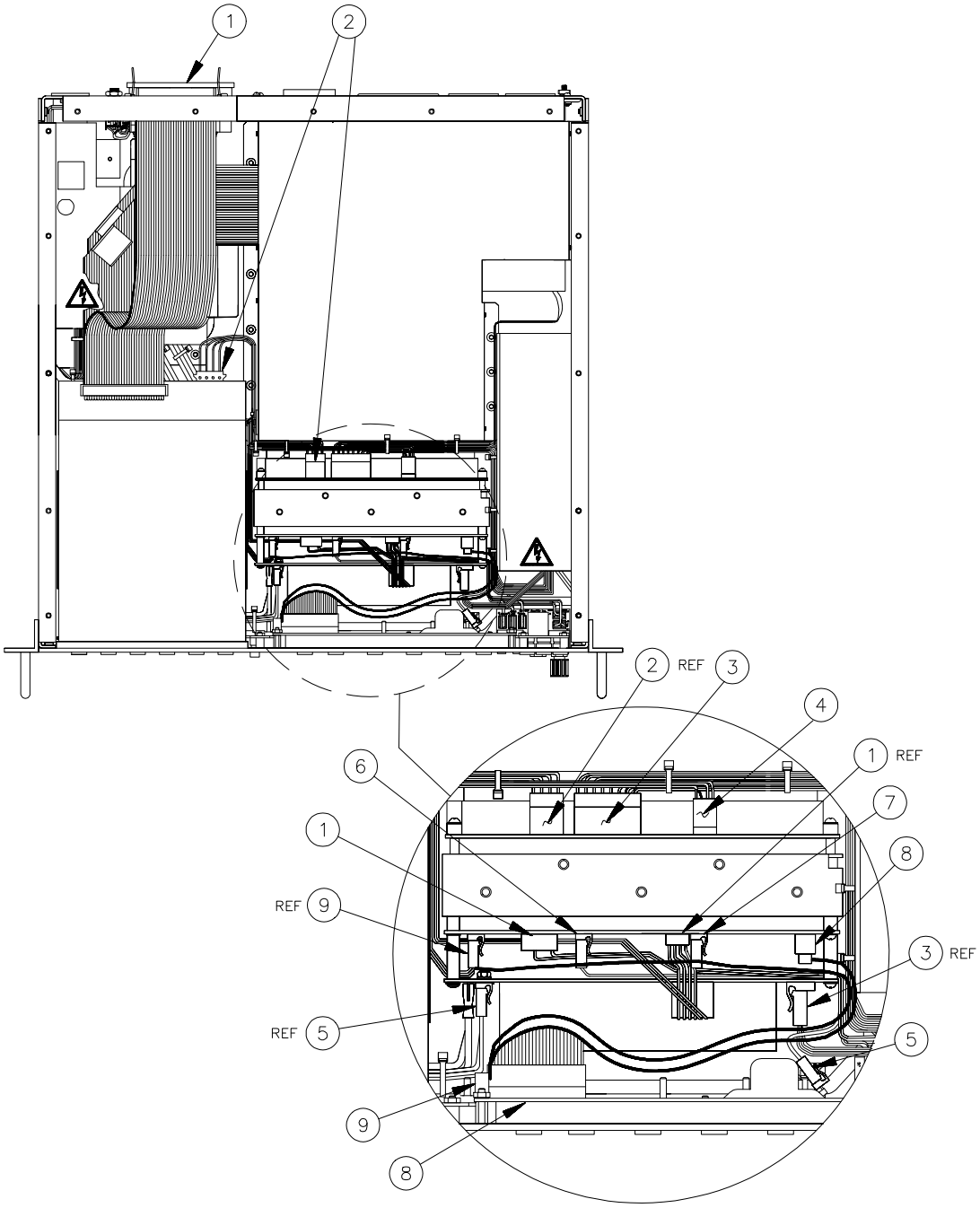
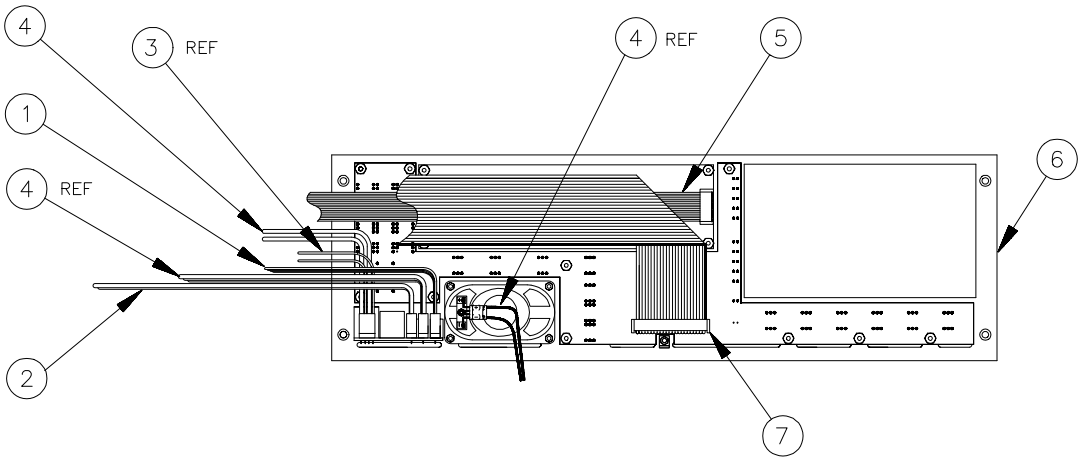


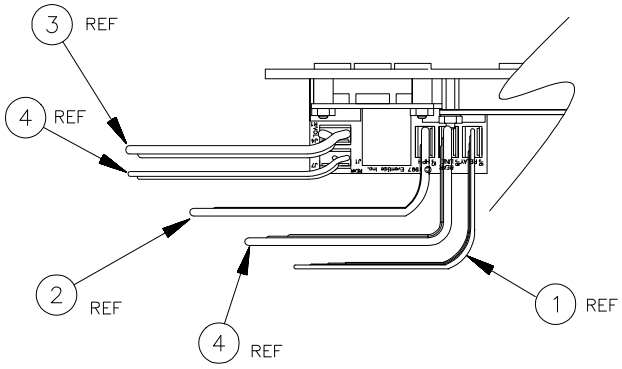
Figure 6-9. Top View of Backplane PCBs

FIG. AND ITEM NO.	PART NUMBER	DESCRIPTION	USABLE ON CODE	QTY
6-9		AUDIO LOGGING RECORDER (TOP VIEW OF BACKPLANE PCBs)		RF
1	105078	RIGHT REAR PANEL ASSEMBLY		1
2	264058	CABLE ASSY, MOTHERBOARD TO DRIVES		1
3	264044	CABLE ASSY, MAIN P.S. TO I/O, UPS, MOTHERBOARD		1
4	264027	CABLE ASSY, MOTHERBOARD TO I/O CONTROL		1
5	264032	CABLE ASSY, TRANSFORMER TO UPS BOARD		1
6	264089	RELAY CABLE I/O TO FRONT PANEL		1
7	264097	CABLE ASSY, LINE/HEAD PHONE		1
8	264095	I/O TO FRONT PANEL DATA CABLE ASSY		1
9	264096	CABLE ASSY, I/;O CONTROL BD TO LCD DISPLAY		1

RF - REFERENCED



INTERNAL VIEW, FRONT PANEL ASSEMBLY



FRONT PANEL CONNECTOR BOARD VIEW

Figure 6-10. Front Panel Assembly Cable Connections

FIG. AND ITEM NO.	PART NUMBER	DESCRIPTION	USABLE ON CODE	QTY
6-10		AUDIO LOGGING RECORDER (FRONT PANEL ASSEMBLY CABLE CONNECTIONS)		RF
1	264089	RELAY CABLE I/O TO FRONT PANEL		1
2	264097	CABLE ASSY, LINE/HEAD PHONE		1
3	264098	CABLE ASSY, VOLUME		1
4	105078	RIGHT REAR PANEL ASSY		1
5	264096	CABLE ASSY, I/O CONTROL BD TO LCD DISPLAY		1
6	105077	FRONT PANEL ASSEMBLY (SEE FIGURE 6-11 FOR DETAILS)		1
7	264095	I/O TO FRONT PANEL DATA CABLE ASSY		1

RF – REFERENCED

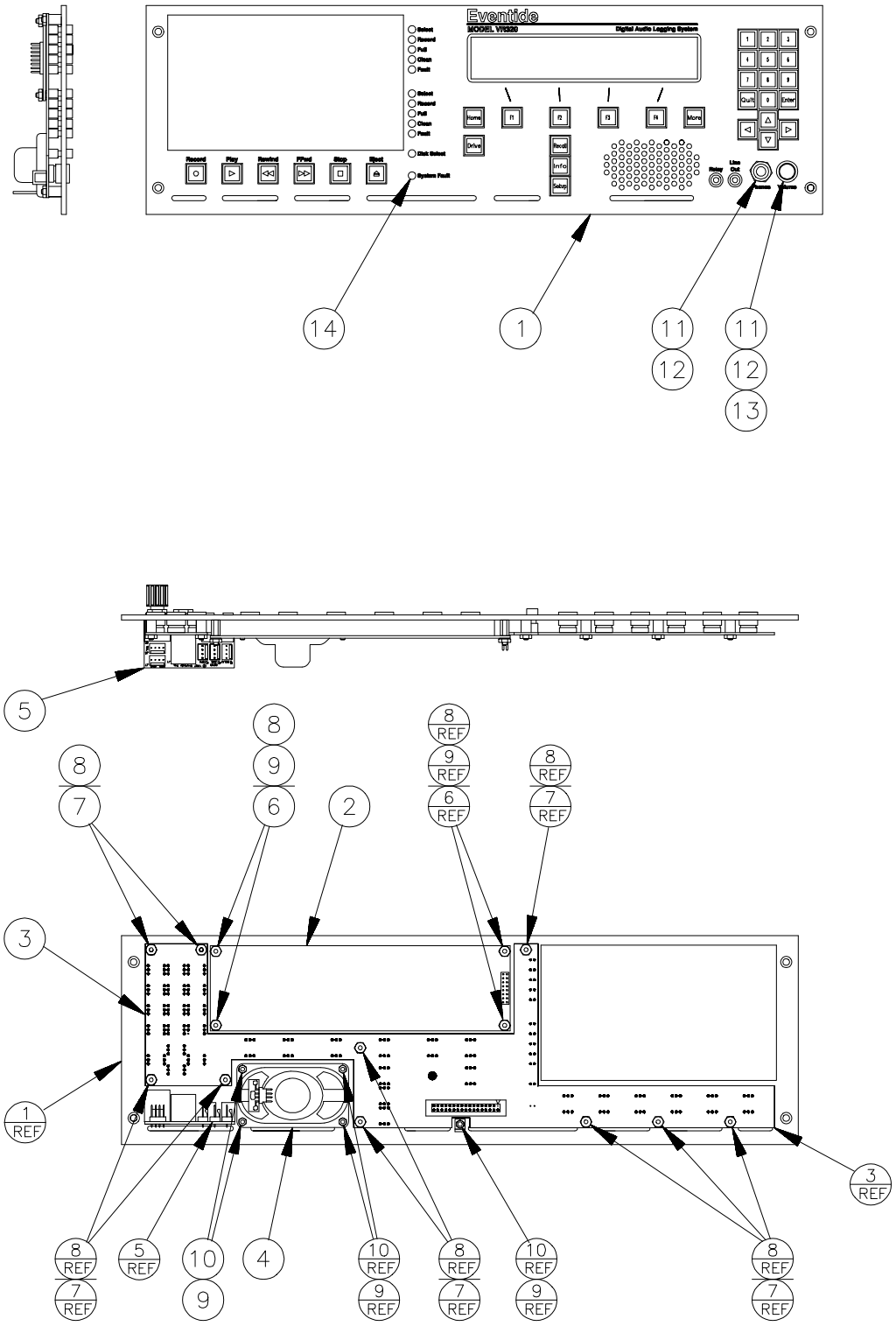


Figure 6-11. Front Panel Assembly

FIG. AND ITEM NO.	PART NUMBER	DESCRIPTION	USABLE ON CODE	QTY
6-11	105077	FRONT PANEL ASSY		RF
1	302008	PANEL FRONT		1
2	102124	LCD ASSEMBLY		1
3	102121	FRONT PANEL PCB ASSEMBLY		1
4	105080	SPEAKER ASSEMBLY		1
5	102112	FRONT PANEL CONNECTOR ASSEMBLY		1
6	324153	STANDOFF, HEX #4-40 X 3/8 LG., ALUM		4
7	324151	SPACER, ¼ DIA X 9/32 HT		10
8	321014	NUT, #4-40 X ¼, HEX		14
9	321013	LOCK WASHER, SPLIT, #4-40		9
10	321015	NUT, #4-40 X 3/16, HEX		5
11	321063	WASHER, NYLON, OD=9/16, ID=.375 T=.025		2
12	321057	NUT, HEX, 3/8-36 X ½, 3/32 THK		2
13	324181	KNOB		1
14	230064	LENS, CLEAR LCD		12

RF - REFERENCED

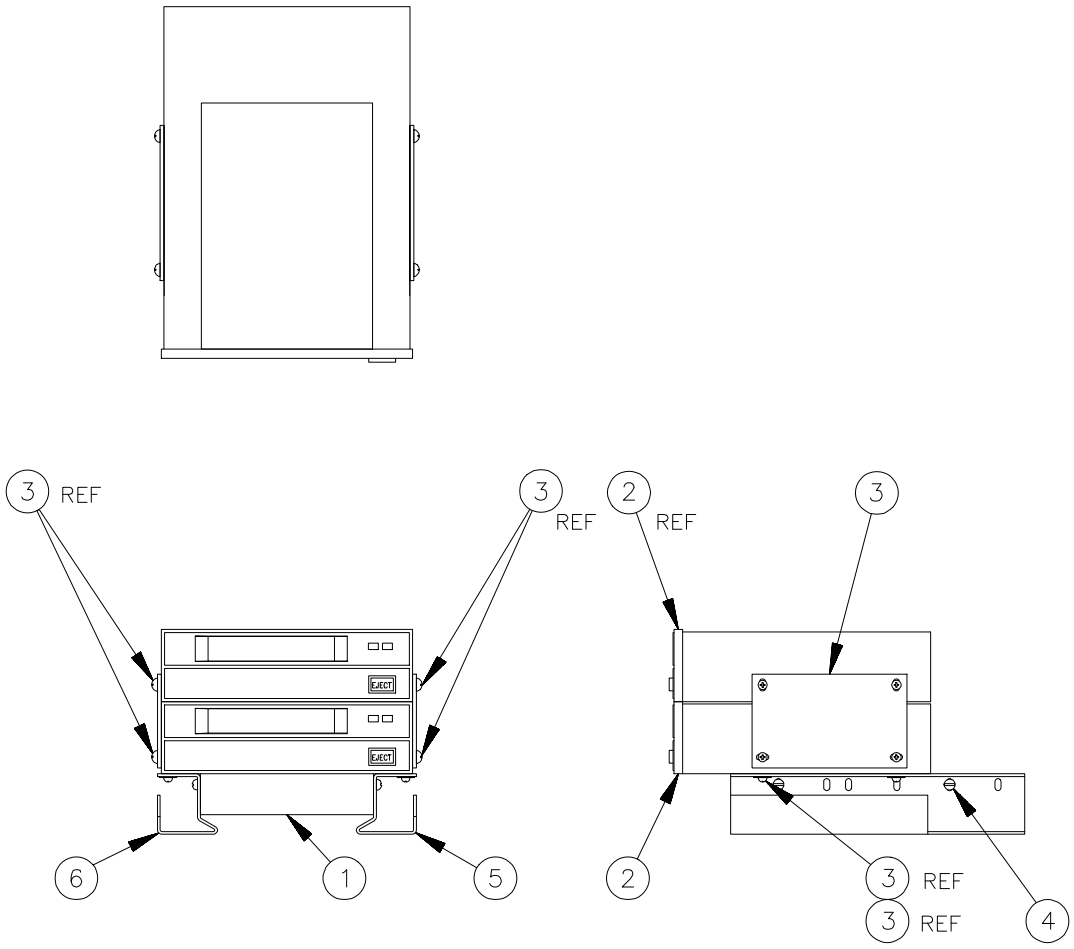


Figure 6-12. Tape Drive Assembly

FIG. AND ITEM NO.	PART NUMBER	DESCRIPTION	USABLE ON CODE	QTY
6-12	105079-001	TAPE DRIVE ASSEMBLY	A	RF
	105079-002	TAPE DRIVE ASSEMBLY	B	RF
1	427081	HARD DRIVE DISK		1
2	427079	TAPE DRIVE	A	2
	427079	TAPE DRIVE	B	1
3	324156	TAPE DRIVE COUPLING PLATE & HARDWARE KIT		2
4	32146	SCREW, #6 X 32 X ¼ PAN HD, PHILLIPS		4
5	300382	BRACKET, RT., UNIVERSAL		1
6	300381	BRACKET, LEFT, UNIVERSAL		1
-7	300265-002	TAPE DRIVE COVER (BLK)	B	1
-8	427082	TAPE DRIVE 427080 CONVERSION KIT		AR

- NOT ILLUSTRATED
RF – REFERENCED
AR – AS REQUIRED

APPENDIX A
CLOCK ACCURACY, ADJUSTMENT AND TIME CODE INPUT

A-1. FUNCTIONAL DESCRIPTION.

Eventide manufactures a standalone, accessory clock/display unit. This clock obtains standard time from the Global Positioning System satellite constellation, and is usable anywhere in the world. It has a large, configurable display that shows a time display as setup by the user. The clock generates a time code for the VR320 which will keep the VR320 accurate with respect to UTC or local time indefinitely. Further information on this clock is available from Eventide. If you use this accessory clock, most of the information in Appendix A will be of little interest and can be disregarded.

The VR320 has a built-in battery operated clock. This clock maintains the time and date whether power is supplied to the recorder or not. It understands months with varying numbers of days and leap years, although it does not understand UTC leap seconds. Since knowing the time at which an event occurs or a signal is transmitted is central to the purpose of a logging recorder, we feel it appropriate to include this description on the performance of the VR320 clock.

The clock uses a crystal resonator operating at 32,768 Hz. This is divided digitally to create one-second ticks which are further used to count minutes, hours, etc. The accuracy of the clock is completely dependent upon the accuracy of the crystal oscillator. When we adjust the frequency of the oscillator at the factory, it is correct to better than .1 Hz, which corresponds to an accuracy of about 1 second every 4 days. Unfortunately, the crystal frequency is subject to drift over time, drift over temperature, and accidental misadjustment. For these reasons, it is not reasonable to expect more than about 1 second per day accuracy. If the unit is being operated at unusually high or low temperatures, it could be significantly worse.

Your need for clock accuracy might range from absolute to unimportant. Of course, the relative timing between channels will remain essentially perfect regardless of the absolute difference between the VR320 clock and the Naval Observatory. If all you need is relative timing, errors of many seconds or even minutes might not matter.

There are several ways of increasing the accuracy of the time on the VR320. The most obvious is simply to set the clock against an absolute standard as often as necessary. To do this, you obviously need a standard. Here are several suggestions:

a. If you are affiliated with a network or news service, they frequently provide time marks.

b. Monitor one of the many short wave time standards available. Here are a few:

STATION	LOCATION	FREQUENCY
WWV	Boulder CO	5,10,15,20 MHz (exactly)
WWVH	Hawaii	15 MHz

WWVB	Boulder CO	60kHz (requires special receiver)
CHU	Canada	7.335 MHz

c. Call your local telephone company's time number.

d. Log-on to internet at www.bldrdoc.gov.

Another way is to adjust the internal clock for your location's temperature. You do not necessarily need an extremely accurate counter, although it should have very good resolution. Observe the clock for several days or weeks and note how much time it gains or loses. Let's say it is losing one second per day. This means that the frequency of the internal oscillator is 32768 multiplied by the number of seconds per day it is counting, (24*3600)-1, divided by the number of seconds in a day, (24*3600). Because the clock test point gives the frequency of the crystal divided by four, the frequency you should read will be 8191.905 Hz. If your counter reads this frequency as well, simply readjust the clock to give 8192. If your counter reads something else, just note the difference between the actual frequency (8191.905) and 8192, or .095 Hz. Readjust the oscillator to read .095Hz higher on your counter, regardless of what the actual frequency is.

Many modern frequency counters actually can read small fractions of a Hz quickly, by using a "multiple period average" time count and converting this count to frequency with their microprocessors. If your counter is an older model, you may have to explicitly use the multiple period average function is available, or a long "gate time" if it is not.

A-2. CLOCK FREQUENCY ADJUSTMENT.

Refer to paragraph 5-18 and Figure 5-16 for the VR320 CPU-3 time clock adjustment procedures.

A-3. LITHIUM BATTERY VOLTAGE CHECK.

The clock is powered by a lithium battery that allows it to keep time even if no power is applied to the VR320. This battery also powers the non-volatile RAM that maintains unit configuration information such as channel descriptors. Since this battery has a nominal 5-year lifetime, and only provides power when the unit is turned OFF, it should last indefinitely. Nonetheless, as long as you have the unit open, you can, if you wish, check the battery voltage. Confirm that it is greater than 2.8V by measuring the voltage between the chassis ground and the top surface of the battery, using a high input impedance digital voltmeter. (Note: If the battery voltage is low, the VR320 will normally sense this during self test and advise you to replace it.)

A-4. TIME CODE INPUT.

The VR320 provides an input for a time code generator. By sending time data, the clock of the VR320 can be automatically updated and corrected so that it remains within two seconds of the generator at all times. The time code input overrides the internal clock, so that setting the clock (or clock frequency) as described in paragraph 5-18 is unnecessary. The time code generator should be connected to PORT B on the VR320 rear panel using an RS-232 serial connection. The input is on PIN 6, the return is on PIN 3. Note that PORT B is also used for the optional label printer and

interconnection of two VR320s in the alternate recording mode. The PORT B pins used are different for each and it is possible to use any combination of features simultaneously. Time code can also be input using an RS-485 or RS-422 interface. Connections can be made to port D using serial channel F (see Figure 2-5).

A-5. RS-232 CONFIGURATION AND DATA FORMAT.

NOTE

Configuration of either channel B (RS232) or channel F (RS485) may be used.

In order to receive time code data, the generator must create the data in the proper format, and the RS-232 parameters of the VR320 must match those of the generator, whose data is received on RS-232 channel B. To configure channel B, start out from the **Home** screen. Press **Setup/System/More/More/Serial I/O.** At this point, you will see the **CURSOR** under **CHAN A**. Select **CHAN B** with the **CHANGE** soft key, and user the **CURSOR** key in conjunction with the **CHANGE** key to select the speed, **BITS, STOP** bits, and **PARITY** to match your data stream. The factory defaults are 9600 baud, 8 data bits, 2 stop bits, and no parity. When you have completed your selection, hit **SAVE** to preserve your settings.

The data format of the time code input is an ASCII string containing 26 characters as follows:

<CR><LF><status><SP>WWW<SP>DDMMMYY<SP>HH:MM:SS<CR><LF>

#	Character	Comments
1	<CR>	Carriage return, decimal 13, hex 0D
2	<LF>	Line feed, decimal 10, hex 0A
3	<SP|?|*>	Either a space (decimal 32, hex 20), a question mark, or asterisk. Note that any of these characters is accepted; any other character is invalid.
4	<SP>	Space
5	<day char 1 A-Z>	First character of the day of the week
6	<day char 2 A-Z>	Second character of the day of the week
7	<day char 3 A-Z>	Third character of the day of the week
8	<SP>	Space
9	<day 10s digit>	Day of month 0 through 3 (or space for day 1 through 9)
10	<day 1s digit>	0 through 9. 1 through 28, 30, or 31 valid depending on month.
11	<month char 1>	Valid values are JAN, FEB, MAR, APR
12	<month char 2>	MAY, JUN, JUL, AUG
13	<month char 3>	SEP, OCT, NOV, DEC (values are language-invariant)
14	<year 10s digit>	Year, 00-99
15	<year 1s digit>	
16	<SP>	Space
17	<hour 10s digit>	Hour, 00-23
18	<hour 1s digit>	
19	<:>	Colon, decimal 58, hex 3A
20	<minute 10s digit>	Minute, 00-59

#	Character	Comments
21	<minute 1s digit>	
22	<:>	Colon
23	<second 10s>	Second, 00-59
24	<second 1s>	
25	<CR>	
26	<LF>	

The character string is expected to be generated and received either once per minute or once per second. To prevent transient errors from accidentally setting the time on the VR320, two syntactically valid updates must be received sequentially before the internal clock is adjusted.

To be syntactically valid, all the conditions above must be satisfied. If any invalid value is received, that update is ignored. The day-of-week characters must be valid ASCII characters in the range A-Z. Any of these characters may be sent; the VR320 does its own day-of-week calculation and ignores the actual day, but it will check for valid alphabetic characters. The month abbreviation **is** used, and must be sent and spelled correctly. (Note that CR/LF sent BEFORE the message is required. It is not absolutely necessary to send the trailing CR/LF providing one is sent before the next time message.)

To be used, at least two updates, the second showing a time exactly one second or one minute later than the first, must be received. (Note that they need not be exactly one second or one minute apart in real time.) When the second update is received, it is compared with the VR320's internal clock. If there is a difference of at least two seconds, the internal clock is updated to match the data received from the time code generator.

It is normal for the VR320 internal time to differ from that of the time code generator by up to two seconds. It is also normal for the VR320 to require up to a minute before responding to time changes commanded by the generator.

A-6. VR320 CLOCK EXAMPLE.

To set the VR320 clock to 13:14:00 on 16 December 1992, send the following character sequences:

<CR><LF>
"SP SP DDD SP 06DEC92 SP 13:13:00"<CR><LF>

(time delay of approximately one minute)

<CR><LF>
"SP SP DDD SP 06DEC92 SP 13:14:00"<CR><LF>

(or the following, after a time delay of approximately one second)

<CR><LF>
"SP SP DDD SP 06DEC92 SP 13:13:01"<CR><LF>

(**SP** signifies a space character)

When the second sequence is received, the VR320 will synchronize with it.

This format is generated by Eventide's accessory clock, described at the beginning of this Appendix, and is also an available output format from the Spectracom NETCLOCK/2. Spectracom can be reached at (716) 381-4827.

A-7. STATUS PRINTER INDICATION.

When the internal timecode is resynchronized to an external source, the optional status printer, if connected, will indicate the old time and new time. The frequency and direction of these resynchronizations is a good indicator of how accurately the internal clock is adjusted.

APPENDIX B
4mm TAPE ISSUES

B-1. AVAILABILITY AND SELECTION.

VR320s equipped with 4mm tape drives are designed to use “Helical Scan 4mm Data Cartridges” as a recording medium. These cartridges are colloquially and redundantly known as DAT tapes (Digital Audio Tape tapes). It is important to understand the differences among the tapes usable in the VR320. In some applications it may not matter which brand or quality you use; in others it may be critical. We strongly recommend that you use only tapes marked DDS, DDS2, or DDS3, depending on the types of drives installed in your VR320.

B-2. TAPE TYPES AVAILABLE.

The difference between DSS Data Cartridges and DAT tapes is primarily one of certified quality. While the tapes are physically compatible and interchangeable, the Data Cartridges are certified to have a limited number of defects and dropouts. DAT tapes primarily are used on audio applications, which are not so demanding as data storage. Although the VR320 is an audio logger, it logs the audio in data format. While it might be argued that a bad bit in the logged data is of little significance, our hardware and the drive assemblies do not see it that way. As described in Chapter 4, the drives employ error correction to make sure that there are no bad bits. If the tape has a defect or dropout, the data is re-recorded until it is completely correct. (And remember, we are also logging digital data, such as time, with the audio.)

If there is a dropout on the tape, it will not affect the data recorded, but it will waste tape. If there are many dropouts, a lot of tape will be wasted. If the wasted tape exceeds the margins built into the hardware and firmware, there will not be enough tape to record the full amount of data expected, and loss of data may result.

B-3. SELECTING YOUR TAPE.

Your tape selection will depend primarily upon your application. Please remember that you use audio grade tapes essentially “at your own risk”. It has been our experience that their quality varies significantly, both from manufacturer to manufacturer and lot to lot. The only time audio grade tapes may be a good choice is when cost is of paramount importance and you know for certain that you will change the tape long before it is expected to be full. Another risk incurred in using audio or even non-approved data tapes is the possibility of oxide shedding and head clogging. Particles shed from a poor quality tape can become lodged in the head assembly of the drive and cause an increased error rate or even failure of the drive.

We therefore recommend data grade tapes in every case. While they are more costly, they will give more reliable and predictable performance.

B-4. THE TAPE COUNTER AND TAPE CAPACITY.

The VR320 recognizes and operates with 90, 120, and 125 (DDS-3 equipped machines) meter DDS tapes. The tape counter is re-calibrated depending upon the length of the tape. Therefore, "tape full" will occur in the 9900-9999 range regardless of selected length. Tape changeover, in units so equipped and configured, usually occurs in the 9600-9900 range. As discussed earlier, poor quality or overused tapes may have reduced capacity. If the counter reads too low when you get a tape full indication or switch-over, it probably means that the tape is bad or that the drives need cleaning.

B-5. DATA CARE AND STORAGE.

DDS tapes are small, convenient, and robust. There are no unusual precautions you need to take with respect to care and storage of either new or recorded tapes. Common sense and the manufacturer's specifications do dictate a minimum of care, however. Remember, your recorded tapes may be called upon to disgorge their data months or years after you have put them away. Something that might be benign for a short period can cause a loss of data over a long period.

B-6. STORAGE TEMPERATURE AND HUMIDITY.

The DDS standard calls for storing the tapes between 5°C and 32°C (41°F to 90°F). This comfortably encompasses the range of room temperature. Be careful not to store the tape in an area where the temperature changes radically. Window sills, radiators, and similar locations are right out.

The humidity standard is 40% to 60%, non-condensing. It is rather more difficult to assure this specification since most locations do not have humidity indicators available. Obvious suggestions include not storing your tapes in basements or rooms where there could be a major water spill.

Not stated in the specification, but perhaps even more important: Try to keep the environment relatively constant if possible. You will potentially do more damage to your tapes if you put them in an environment in which the temperature and humidity are constantly changing or cycling than if you simply leave them alone at either end of the spec.

B-7. ACCIDENTAL ERASURE.

DDS tapes store information magnetically, just like ordinary audio tapes. However, the magnetic formulation has a higher "coercivity," which means that it requires a stronger magnetic field to modify the information stored on the tape. While routine transportation and storage should have no effect on the information stored, we recommend that you avoid storing the tapes near objects that generate magnetic fields, such as loudspeakers, electric motors, television sets, etc. (There is nothing to fear from going through airport metal detectors.)

B-8. DELIBERATE ERASURE.

There should never be a need to deliberately erase a tape. Our formatting procedure will prevent access to previously recorded data. If you feel you must erase a tape for security reasons, you can use a standard audio DAT recorder to record over it. Alternatively, use the **COPY** function of a dual-drive VR320 to record non-critical data over the material to be erased.

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APPENDIX C
UNINTERRUPTABLE POWER SUPPLY (UPS)

C-1. FUNCTIONAL DESCRIPTION.

The VR320 employs a UPS to prevent AC power problems from adversely affecting the operation of the recorder. The UPS derives its power from a multicell lead-acid storage battery in the VR320 chassis. The battery is charged whenever the VR320 is operating; the charge rate is normally very low (trickle charge), but increases significantly if the battery has become discharged. The battery has sufficient capacity to run the VR320 for about two minutes if AC power is interrupted.

The purpose of the UPS is *not* to allow the unit to continue operating during major power failures. The limited battery capacity precludes this in any event, and most facilities that employ logging recorders have a standby power source, usually a diesel-powered AC generator that comes on automatically when primary power fails. The UPS serves two purposes:

It prevents power problems during momentary AC interruptions. AC problems can be characterized by, among other things, their time duration. The most frequent type of problem lasts anywhere from a fraction of an AC cycle to a few cycles. These “glitches” are typically caused by load transients such as motors being switched on and off. Most well-designed electronic equipment can cope with these glitches without any special precautions. The next category is the line dropout that lasts from many cycles to a fraction of a minute. These problems can be caused by people accidentally switching off circuit breakers, lightning strikes, and other problems that cause a temporary interruption of service. And finally, there are serious outages, of from many minutes to many hours or even days, caused by accidents, natural disasters, etc. Against the first category, the VR320 needs no protection. Against the last category, the only protection that can be provided is your own backup power source; if you do not have one, the chances are you also have nothing to log! The middle category, multi-second power problems, are far more frequent than natural disasters, and could be very disruptive to a logger. Because the UPS is present, the VR320 can simply ignore brief power failures. It will continue operating until power comes back.

Equally important, the UPS prevents media and other problems during longer outages. Each digital media has index data recorded on it. This is usually recorded when the media is ejected. If power were simply shut off, the index data would be lost, and would require hours to recreate. Even worse, if the unit happened to be recording critical information when power was lost, the media could become irretrievable. The UPS incorporates a timer to determine whether a power failure can be ignored or requires action on the part of the VR320.

If the failure lasts for less than about 30 seconds, it is ignored. If the failure continues beyond 30 seconds, the VR320 automatically shuts down after writing index data. It also saves information on the cause of the shutdown and the fact that it was recording in its internal memory. That way, when power returns, it can resume recording from where it left off without human intervention.

The recorder is smart enough to know that if it is not recording or playing, it can shut off after 30 seconds without further action. In that event, reapplying power results in a normal startup.

C-2. UPS PRECAUTIONS.

It is not impossible to defeat the UPS' utility. If your facility is subject to frequent power failures of many seconds duration, it is possible to discharge the batteries faster than they are automatically recharged. The unit protects itself by automatically shutting down if the battery voltage gets too low, notwithstanding the timeout period. If this happens, it may be necessary to reconstruct the media index.

Batteries have a limited service life and should be checked periodically by following the recommendations in the maintenance section.

APPENDIX D
SOFTWARE UPDATE PROCEDURE

The VR320 is controlled by software contained in a pair of EPROMs on the CPU board. As with all complex software-controlled devices, it is probable that updates will be issued, both to resolve defects ("bugs") and to enhance the product. If you receive an update from Eventide, the following procedure installs it.

a. **Stop all recording on both drives and the internal hard disk.**

b. Remove media from both drives.

c. Load the software upgrade medium into either drive. It will take a few minutes to be recognized by the VR320.

d. You will be asked to confirm if you wish to load the new software. Press the **Yes** soft key.

e. After a few minutes the VR320 will eject the software upgrade media.

f. Now you not only have the latest software installed in your VR320 but you are richer by one piece of recordable media. Disable the write-protection tab the next time you load the media. When asked if you want to load the new software, press **Cancel**. The display will read "bad index." Press **F2** the prepmedia soft key. Format the medium and it is ready to use.

APPENDIX E
VR320 SYSTEM TREES

Appendix E provides the VR320 system trees that contain the menu and configuration selections available when operating the VR320.

APPENDIX F
EVENTIDE DIGITAL LOGGING PRODUCTS: YEAR 2000 CONSIDERATIONS

PRODUCTS AFFECTED

Model VP204	Playback Unit
Model VR204	4-Channel Digital Logging Recorder
Model VR240	8-24 Channel Digital Logging Recorder
Model VR320	8-32 Channel Digital Logging Recorder
Model DIR-911	Digital Instant Recall Recorder

STATEMENT

The change in year from 1999 to 2000 will have no affect on the performance of any of Eventide's digital logging recorders, playback units, or digital instant recall recorders. All of these products are designed for proper calendar operation within the 100-year period of 1989 through 2088. Any 2-digit year in the range of 00-88 is assumed to refer to actual years 2000-2088. Any 2-digit year in the range of 89-99 is assumed to refer to actual years 1989-1999.

DISCUSSION

All material recorded on Eventide digital logging recorders is time coded. The time code is stored as a 32-bit binary number representing the number of seconds since 00:00:00 on Sunday January 1, 1989. When a user sets the time clock or specifies a search time, the 2-digit year is assumed to be in the range of 1989-2088. A 32-bit number has a maximum unsigned integer value of 4,294,967,295. This is more than enough to represent 100 years in seconds. (Note: This last paragraph is not relevant to the DIR-911 instant recall recorder.)

The major concern of people worried about the "Y2K problem" is that computers and other software-based equipment will misinterpret 2-digit years, leading to problems with expiration dates, birthdays, etc. Eventide's way of storing time code and interpreting 2-digit years ensures that there will not be calendar-related problems until 2089.

CONCLUSION

All of Eventide's digital logging recorders, playback units, and instant recall recorders will perform without calendar-related problems due to the change in year from 1999 to 2000. Customers and users should simply be aware that 2-digit years would be assumed to refer to 1989-2088.

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LIMITED WARRANTY

The Eventide VR320 is warranted against defects in material and workmanship for one year from the date of purchase by the original purchaser from Eventide or an authorized dealer. Within the warranty period, Eventide will replace or repair, at its option, a VR320 or subassembly that becomes defective during ordinary service. This warranty does not cover damage caused by mechanical or electrical abuse, such as physical damage, lightning, or connection to an inappropriate power source. It also does not cover additional damage caused by unsuccessful attempted repairs.

EXCLUSION

The recorder is not warranted to operate continuously or without error or interruption. Eventide specifically disclaims liability for consequential damaged caused by the unit failing to record. Our sole liability is to repair or replace the unit as described herein.

Responsibility for Shipping

To obtain service under this warranty, it is the responsibility of the customer to notify Eventide of any defects, at which time Eventide will either send replacement hardware as it determines appropriate, or will request return of the unit or of the defective module for repair. All shipping charges to Eventide are the responsibility of the customer. Eventide will pay for normal return shipping to the customer within the United States, and premium shipping charges within the United States, if requested by the customer, are the responsibility of the customer.

Additional Information

Please return your warranty card! The warranty begins when you receive the unit, and is not affected by your filling in the card. However, if we don't receive your card, we don't know who you are and can't send you update information or software. We plan to implement additional features that can be added simply by replacing EPROMs or loading an upgrade tape in an empty drive.

For our overseas customers, our time zone is GMT-5 (GMT-4 in the summer), and our official hours are 09:00 to 16:00. However, it is usually possible to call until 18:00 and still get useful information.

All return shipments from outside the United States shipments *must* be fully prepaid, including customs charges, to our door. We recommend using UPS (United Parcel Service) if it is available in your area. Our shipping address is:

Eventide Inc.
1 Alsan Way
Little Ferry, New Jersey, 07643
United States of America

Our telephone number is: (201) 641-1200

Web site: www.eventide.com

Our e-mail address: loggers@eventide.com